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I.

THE THERAPEUTIC VALUE OF RADIUM IN THE TREATMENT OF DISEASES OF THE UPPER AIR TRACT.

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Directly after the discovery of radium by the Curies and as soon as it could be purchased in this country, several investigators began experimenting with it. Some of these stopped short; their expectations were too high and were not fulfilled; others unequivocally lauded it to the sky, and their followers met with severe disappointment and dropped it. While discussing the merits of radium at a meeting of medical and non-medical men in this city, a gentleman recommended the fumes or inhalations of it for almost all diseases, including tuberculosis and cancer. Like remarks served to discourage its application, and, in fact, very little was heard about it during the next five years. There were a few men in this country,

however, who continued its rational application, and the writer appears to be the only one who applied it systematically in diseases of the upper air tract. Having a priori a rather pessimistic view of every therapeutic agent, his expectations were not high. Even to-day, after years of experience, he does not believe that radium is a panacea for everything, but he is convinced that it is a most wonderful remedy in certain diseases, if correctly applied.

Epithelioma of the skin is one of these. It is true that these cases are improved, and even cured under X-ray treatment, but, as you know, that is a complicated procedure, and not always without danger. This is especially important in the cases seen by me which affected the nose and its vicinity, the upper lip and the cheek. A scar or a burn left after the application of the Roentgen rays is unsightly in man or woman. In the four cases treated with radium we have had very gratifying results.

Case 1. (Presented to the Section on Laryngology of the New York Academy of Medicine, December 23d, 1909.) S. S., 42 years of age, noticed a blister on his nose eight years before consulting me, which broke and discharged a watery secretion, and then dried up. Later, other blisters appeared and disappeared on the left ala nasi, the upper lip, and the neighboring parts. The patient consulted one physician after another—that was in Russia—and finally fell into the hands of a barber, who cauterized him so energetically that a perforation was produced which necessitated a plastic operation of the lip, etc. This cured him for the time being, but four years later the old trouble recommenced. The blisters appeared and disappeared, and he was rarely free of them. During the last four years, however, the blisters did not break. He has been in this country for three years, and still suffers in spite of everything he has tried.

The first time I saw him he showed the deep seated variety of rodent ulcer (epithelioma); the left ala nasi was almost gone, and along the two scars of the former operations as well as in the left introitus nasi the surface was brownish red or purplish, and secreting scantily. It was sharply defined, with rolled and raised borders, and deep excavations (See Plate I). He was put into the hospital and radium was applied for twenty-four hours steadily (10 mgr. of 1,000,000 radioactivity). This

was somewhat heroic treatment, since I was not sure how deep the effect of the radium would be. But, on the other hand, something radical had to be done, as everything else had been tried in vain. When the radium was removed, there was a mass of deep ulcerations spreading all along the scars and into the nose. These, however, turned out to be benign in character, as they healed under a mild salve within a short time. In order to prevent a recurrence, radium was applied off and on for two hours at a time, and now he has been cured for fourteen months (See Plate II).

The next two cases which the writer has treated with radium were women of twenty-one and twenty-six years, respectively. In both cases the ala nasi was affected. Exposures of twenty to forty-five minutes were tried repeatedly, without any visible effect. Then radium was applied over night, i. e., in one case for fourteen hours; in the other, for twelve hours, and in both cases with splendid results. A fourth case, which was reported in 1906, did not show any improvement.

A year ago Langlet and Sourdeau* published a series of 122 observations of epithelial cancer, made at the Hôpital St. Louis at Paris. They report 87 per cent cures, and believe that of all the cancers that fall into the domain of dermatology not more than 5 or 8 per cent should be unsuccessful. Compared with these numbers, my observations are too limited to allow final conclusions.

Yet my results were so excellent and so easily obtained that the classical remark made by one of the patients may be repeated here: "It worked while I was asleep."

Of other conditions for which radium has been tried, the writer would refer to one of scleroderma of the bridge of the nose and adjoining parts. The dermatologists who saw the case differed in regard to the diagnosis. Some thought it was scleroderma, others pronounced it to be lupus erythematosus. (See Plate III.) The case was referred to me with the idea of having something done intranasally, if possible, as extranasal treatment had been of no avail. The patient, a girl of nineteen, had an atrophic condition of the nasal mucosa,

*Langlet et Sourdeau: Une statistique et quelques réflexions a propos du traitement radiotérapeutique, etc. Annals de Dermatologie et Syphilographie. Fevrier, 1909.

with masses of dried scabs. That process was especially marked on the right side, i. e., the side that showed the lesion externally. After applying radium for several times in the dispensary for from twenty minutes to an hour, without any effect whatever, the patient was sent to the hospital and radium was applied for fourteen hours uninterruptedly. She left the hospital unimproved, but on the fifth day after her dismissal she had a profuse epistaxis, and it was with difficulty that one of my assistants stopped it. On the following day a similar hemorrhage occurred. Her condition at present is about the same.

I have tried radium in a number of cases of atrophic rhinitis, but never for more than ten or twenty minutes at a time. Bleeding occurred quite frequently, and generally two or three days after the application of the radium. The results of the treatment were not encouraging, so that radium was given up in these cases.

But by far the most important affections on which I have used radium are the malignant tumors. If radium is of any value in these cases, it is certainly a blessing to humanity. Permit me to first give you the histories of some of my cases treated during the last few years.

CASE 1 was referred to me by the kindness of Dr. Harmon Smith, who furnished me with the following history: F. L. H., aet. 43, a driver, was admitted to the Manhattan Eye, Ear and Throat Hospital on December 18, 1909, with a nasal obstruction on the right side. Family history negative; no specific history. Eight years previously had noticed some discharge from the right nostril. There was a large mass filling the right naris and pharynx; the tonsils appeared normal. The polypi were cleared out, and at this time a suspicion was aroused as to the character of the growth. A specimen was sent to the laboratory, and the report was: "Columnar-celled epithelioma." At subsequent sittings, more polypi were snared out, and reports always returned the same. Trypsin was given, but with no avail. The patient was referred to a general surgeon, but rebelled against operation.

On March 18, 1910, I saw him for the first time. Radium was immediately applied. The radium was in a small tube and was passed up the nose from the outside, leaving it there for ten minutes. Two days later it was left in for sixty-five minutes.

Three days later, on the 22nd, the patient noticed that he was using fewer handkerchiefs than heretofore, and for the first time I saw some pus in the middle meatus. There was a decided tumefaction in the middle meatus, occupying the middle part of the naris, and this was the mass Dr. Smith had referred to. The best thing would have been to open the antrum and put the radium right in, but the patient objected to all operative interference, so we had to place it in the naris.

On March 22nd the radium was left in place for two hours, and every third day after that it was left in for two hours, or a little more. On April 2nd the radium was applied (10 mg. of one million radioactivity) for forty-two hours. There was no reaction after that. On April 20th an X-ray picture was taken, and though the picture is not very satisfactory I would like to mention it. On the right side a slight cloudiness can be seen, which may be pus, or it may be some tumor or some other foreign growth. At any rate, after that last application of radium, the mass began to grow less. During April and May the radium was applied twice a week, always for two hours. There was always some pus in the middle meatus which seemed to me at that time to indicate a breaking down of tissue within the antrum. I am now convinced this was the case. The tumor, however, did not disappear entirely, and on June 5th the radium was applied for forty-two hours again. At this time, seventy mg. of the strongest radium we have, 1,800,000 radioactivity, was used. Some men who were consulted warned me against it, but I saw no danger in it. In fact, the reaction after applying this strength was almost nil. The nose was slightly sore, and that was all. The tumor disappeared almost entirely. There is a small portion left, but it is a question whether it is the original epithelioma or a benign polypoid growth. The patient will not have anything further done to it. He is perfectly well, has gained flesh, is breathing perfectly through the nose, and is feeling very happy over his condition. I do not believe that we will judge amiss in putting this case down as cured. It is now eight months since the last radium treatment, and there is no recurrence noticeable.

The following case is of equal interest:

CASE 2, referred to me by courtesy of Dr. S. McCullagh, with the following history:

"Osteosarcoma of the Superior Maxilla. Operation. Rapid Recurrence. Mary S., age 18, born in Ireland. Was first seen at the Manhattan Eye, Ear and Throat Hospital, December 2, 1908. For many years she has had a sinus under the right cheek, which discharged at various times. Five months ago she first noticed a growth on the cheek below the inner canthus of the right eye. It is cystic in character, not painful or tender. A needle was introduced at the junction of the cheek and gum, and the cyst was aspirated by Dr. Coffin.

December 19th. The growth is larger than before aspiration. The nasal bones themselves are pushed over to the left side of the face, and there is marked fullness of the right side of the face.

December 21st. Under gas and ether the cheek was dissected up and the mass removed with scissors. It stripped readily from the bone, but was amalgamated with the soft tissues of the cheek.

Pathologic report: 'I presume this represents the base of the growth, since it contains nothing indicative of cyst formation. Fibrous connective tissue filled with the products of inflammation, with underlying muscle tissue, forms the characteristics of the piece submitted for examination.

(Signed) 'JONATHAN WRIGHT.'

March 3rd. The pushing of the nasal bones to the left side of the face and the thickness of the bony tissue under the cheek having become much more marked, a more radical operation was decided upon. An incision was made from just below the inner canthus of the right eye along the junction of the nose and cheek, through the median line of the lip, and thence down to the free edge of the lip. The whole cheek was then dissected off and reflected. The bone was eroded and had a worm eaten appearance over the antrum. The anthral wall and the nasal process of the superior maxilla were much thickened. Practically all of the anterior aspect of the superior maxilla was removed. The antrum was clean. The wound was closed with horsehair sutures. Primary union of skin occurred.

Pathologic report: 'This is a fibrous tumor containing a large amount of newly formed bone. Owing to the action of the decalcifying fluid, the nature of the growth as to its ma-

lignancy cannot be established. I suspect from the looks of the thing and the short history that it may be an osteosarcoma.

(Signed) 'J. WRIGHT.'

April 6th. There seems to be a recurrence of the growth at the external edge of the right nasal bone.

April 23rd. A mass about the size of a hazel nut has developed at this site.

April 28th. Under gas and ether the old incision was reopened and the cheek again reflected. The small remaining portion of the nasal process of the upper maxilla, the right nasal bone, and the nasal process of the right frontal and the internal wall of the antrum were removed. There was no evidence of recurrence in the zygomatic region. The wound was sutured as before. Primary union of skin occurred.

Pathologic report: 'Apparently we have an atypical proliferation of fibrous connective tissue cells from the surface periosteum. In many places, this is thrown into configurations more or less characteristic of fibrosarcoma, but in these masses of new connective tissue numerous cells characteristic of newformed bone cells are seen springing from the fibroblasts. There are no giant cells, and in the absence of more satisfactory sections I should be inclined to base a diagnosis rather upon the clinical features than upon the microscopic findings. So far as these go, I think they would tend to confirm a diagnosis of osteosarcoma.

(Signed) 'J. WRIGHT.'

June 7th. No evidence of recurrence.

November 1st. What seems to be a small retention cyst above the alveolar process, due to closure of a small sinus, has developed. This was opened, wiped with orthochlorphenol, and packed. There is no evidence of recurrence in the bony parts.

March 9, 1910. Recurrence of the tumor has taken place just above the alveolar process. Specimen removed.

Microscopic examination: 'Fibrosarcoma.

(Signed) 'JONATHAN WRIGHT.'

The patient was then referred to Dr. Freudenthal for treatment with radium."

She came to me on March 30th, and I applied radium for thirty minutes. My former experience made me a little more courageous. The radium was applied again two days later,

but no effect was noted. On April 26th, a strong mass of radium, 70 mgr. of 1,800,000 radioactivity, was applied for fifteen hours. Immediately afterward the face became more swollen, and there was a purulent discharge from the nose which lasted for two days. On April 30th I saw her again, and the inferior turbinated body was much more swollen and edematous. On May 14th she told me there was a good deal of purulent discharge from the nose and it felt sore. On that side she bleeds easily. However, the upper lip felt softer than before. I saw no material improvement in the patient, and on June 9th applied the radium again for thirty-six hours at one stretch. Two days later she complained of pain in the right ear, and an otitis media purulenta set in. This was not due to the radium, but to the following circumstances: The radium tube had to be fastened in the nose, for several reasons—one being that it should not fall out, and the other being that the patient should not remove it—the tube being of considerable value; the plugging of the nose was quite firm, and that produced the ear complications; besides this, the whole right side of the nose was edematous and swollen so that she could not breathe through it at all; the skin over that side was also swollen and edematous. However, the swelling and edema subsided promptly, and she breathed more easily than before. The discharge from the right side ceased in four weeks.

The patient was again seen on September 17th, at which time the swelling of the nose had entirely subsided, though there was still a purulent discharge. This discharge seemed to come from an incisor tooth. On September 27th she again came with her whole face swollen from erysipelas. She was sent to Bellevue, and came back cured of the erysipelatous condition, since which time she has been normal. There is now no trace of the former condition, and the case may be considered absolutely cured. (She was seen again March, 1911.)

Case 3, referred to me through the courtesy of Dr. W. P. Wooster, of this city. Mr. F. W. H., aet. 76, former superintendent of a business house. Ten years before consulting me had suffered from "nervous prostration," since which time he is mentally not perfectly normal. For the last two months has had difficulty in swallowing and a mild dysphagia. On inspection, a neoplasm was found, involving the left tonsil,

spreading anteriorly and upward. Microscopic examination showed this mass to be a primary epithelioma of the tonsil. Radium was applied several times, but had to be given up on account of his mental weakness. Result nil.

CASE 4. Epithelioma of Tonsil. Jacob C., aet. 50, was referred to the writer through the courtesy of Drs. Jarecky and Joseph Weinstein. Dr. Weinstein had seen the patient first and had made the diagnosis of epithelioma of the tonsil (by his own microscopic examinations). The patient, who is a rather dull person, gave the following history of his case: Two months before calling upon me he had noticed a swelling on the right side of his neck. Has had no pain, neither when swallowing nor when touched; eats and sleeps well, and has absolutely no complaint excepting the swelling on the neck; has never been sick as far as he can remember, and has never had lues.

On examination I found a mass as large as a fist on the side of the neck, corresponding to the vicinity of the right tonsil; no fluctuation, no pain. The tonsil itself was enlarged to about the size of a big plum. The apparent neoplasm also included, to a slight degree, the tongue. A piece of the tonsillar tissue was removed—followed by slight bleeding—and sent to Dr. Jonathan Wright, who kindly furnished me with the following report:

"The specimen from the tonsil shows, on sectioning, an islandlike infiltration into the lymph spaces of cells which it is impossible definitely to differentiate from endothelium and from the basal layer of the epithelium of the surface, so far as their morphology is concerned, but by running through a number of sections their origin from the basal epithelial cells of the surface investment of the tonsil is plainly made out. They have grown into the lymph spaces in this island form, being everywhere entirely separated from the surface cells, and it is this fact, I think, which has frequently led pathologists to class this kind of growth as an endothelioma of the tonsil; but if the sections are numerous enough the connection can always be made out."

Microscopic diagnosis: "Basal celled epithelioma (Krompacher.)"

On November 6, 1910, radium treatment was commenced. The patient was rather awkward and it was a rather difficult

matter to press his tongue down and introduce the radium (on a holder). It could not be kept in longer than twenty minutes. After that date, however, the radium was applied for fifty to sixty minutes, but the treatment was not satisfactory to me as the patient was unreliable and turned the point occasionally to the other side, etc. Ulcerations of the tonsils and tongue appeared soon.

Up to December 11, 1910, he received treatment for twelve hours altogether, without any diminution of the mass outside being noticeable. Inside, the tonsil was somewhat ulcerated.

The result of our treatment thus far being almost nil, it was decided that the application of the radium had to be pushed more vigorously. Consequently, on December 17, 1910, I made an incision outside over the affected parts and buried two tubes of radium deep in the tumor mass at different places. The one tube contained seventy mgr. of radium of 1,800,000 radioactivity, and the other, ten mgr. of 1,000,000 radioactivity. The two tubes were left in for 50 hours. The parts outside did not look much changed immediately afterwards, but very soon began to slough.

On December 28, 1910, it was noticed that the tonsil was very much ulcerated. On that date the radium was again put into the outer wound (the weaker tube), and was left in for 72 hours. In the meanwhile, the patient was not confined to his bed, but walked about in his house. After that, however, he seemed somewhat weak, and on January 12, 1911, when Dr. Weinstein changed the dressing, about half a tumblerful of yellowish pus came out. On January 18th, the smaller tube was again inserted and removed on January 21st, being in situ for 72 hours again, the patient meanwhile going to his home in Brooklyn and reporting every morning. The tube was immediately reinserted, and left in for two days more, so that it was in place for 120 hours, or five days, continuously. The patient felt none the worse for it, and the tumor was somewhat diminished in size.

Case 5, referred through the courtesy of Dr. Thomas J. Harris. The history as given to me partly by Dr. Harris and partly by the patient, is as follows: Mr. A. J. P., a pattern-maker of New Britain, Conn., aet. 45, fell sick with the grippe in June, 1910. Had pain in the back and in the left ear. When

something "broke" in his ear, he felt easier, but became hard of hearing. Immediately after that his throat began to trouble him; something seemed stuck in it, which he could not get out, and his speech became so bad that he could not be understood. He was admitted to the Manhattan Eye, Ear and Throat Hospital, where Dr. Harris examined him and found a growth situated in the nasopharynx and occupying the left side. This was found to be a lymphosarcoma, and the patient was transferred to the Presbyterian Hospital for operation by Dr. Blake, which was done in October, 1910. He came to me ten days after leaving the hospital, November 9, 1910, and I found that the mass had already commenced growing again. There was a mass coming up on the upper part of the septum narium, and another on the roof of the pharynx on the left side. The tissues all seemed infiltrated, the left side more than the right, but the latter was not entirely free. Radium was applied on November 10th for ten minutes; on November 11th for thirty-two minutes, and on November 12th for one hour. On November 13th the patient complained of pain in the nasopharynx and was allowed to go to his home. The pain, however, was not due to the radium itself, but to the tube, which was too long. It was shortened as much as possible, and inserted again, on November 16th and 17th, for one hour respectively; November 18th, two hours and ten minutes; November 19th, one hour and fifteen minutes; 20th, 21st and 22nd, for one hour or two hours each time. Ulcer visible in the vault of the pharynx. On November 23rd, radium was applied for one hour and fifteen minutes—slight bleeding; sent to his home; November 28th, ulcer almost disappeared; radium one hour. November 29th, radium two and a half hours; 30th, one hour and fifteen minutes. December 1st, radium for two hours—a good deal of pus and blood came out when tube was removed. December 2nd, radium two hours; 3rd, one hour; 4th, one and a half hours—leaves for his home again.

On December 21st he returned, and, by agreement with Dr. Harris, he went to the Manhattan Eye, Ear and Throat Hospital. I had rings attached to both ends of the tube so that threads could be fastened. Dr. Harris inserted one end of the string through the left naris—which was accomplished with difficulty on account of a deviation of the septum—and pulled the tube up into the nasopharynx. Then both strings

were fastened around the ear, and the patient was given a mild diet and ordered to bed. After 72 hours the radium was taken out, and a sore was found in the nose and a deeper one on the side of the uvula, from the thread cutting through. In the left upper region there was an excavation and ulceration, and a tumefaction was visible toward the roof of the mouth. The mass on the vomer seemed to be less on the left side; on the right side, no change. The radium had given him little trouble during these three days, but it must be remarked that he had a very patient nature. He returned home after that, and I saw him only occasionally.

On January 24th the following status was taken: All thickening at the posterior end of the vomer has disappeared. There is still some ulcerated surface at the vault of the pharynx on the left side. That portion is ulcerated, but it will most likely heal soon. A portion of the cushion of the eustachian tube is gone. Whether or not this is due to the radium, cannot be said. In all probability, the patient will have no recurrence of his trouble. He will, however, be kept under observation for the next six months. (See plates No. IV and V.)

In 1905 the writer published a series of cases treated with radium, a few of which will be mentioned. The effect of radium can best be studied in the larynx.

Mrs. Y. presented a typical picture of laryngeal tuberculosis. I said at that time: Remarkable were the granulations (infiltrations) springing up from different parts of the larynx, thus diminishing its lumen materially. For that reason we were compelled twice, on account of slight dyspnea, to interrupt the treatment. A day sufficed to restore these parts and widen the glottis. The granulations that sprang up so quickly after a few exposures are analogous in one respect to the changes produced by the injection of the old tuberculin. All those who remember the first injections of Koch's old tuberculin, at the end of 1890 and early in 1891, when large doses were given, will perhaps also recall the occurrence of large granulations arising in the larynx in cases complicated with tuberculosis of that organ. The patient died about six months later from pulmonary tuberculosis. During that time she had little trouble with her throat.

Another case reported in 1905 is the following:

Case 7. J. J., a tailor, 60 years of age, consulted me in

the fall of 1904. His trouble had commenced a year previously, with a toothache. Not being in a position to spare the time, he did not consult a dentist until six months later, when the pain had become quite severe and a swelling appeared in the throat. He was told at that time that he had a malignant tumor. When I first saw him the right tonsil was greatly swollen, and three large segments could be distinguished. This swelling extended some distance to the inferior maxilla. At the same time had an anchylosis of the right arm, with swelling in the elbow joint. The whole process seemed to indicate a syphilitic origin, and he was given salicylates and iodide of potash. The elbow joint improved quickly and has not bothered him since. The tumor of the tonsil very soon proved to be epithelioma. All operative intervention being refused, radium was applied. The effect was remarkable. The tumor commenced to increase rapidly in size, and after a few sittings broke down, a large quantity of pus being evacuated. The patient experienced great relief, but this did not last very long. The mass soon spread all over and he died several months later. Result of radium treatment, nil.

Case 8. S. C., age 60, has been hoarse for the last five months, and has been treated by a throat specialist, who referred him to me. On April 17, 1905, when I first saw him, there was a diffuse swelling of the left vocal chord, more pronounced in its posterior third and extending somewhat to the arytenoid and ventricular band of the same side. It was shown microscopically that this tumor was a carcinoma of the larynx. On April 17th we began with radium, which was applied for five minutes. April 24th, same treatment. On April 25th the radium was omitted as signs of marked edema and venous stasis of the uvula were noticed. On April 26th the uvula appeared more natural, and patient said he had less pain and could swallow more easily; radium used again, and also on the 27th, 28th and 29th, during which time the venous hyperemia disappeared. On May 1st an ulceration on the left side of the uvula was plainly visible, and was more pronounced on the following day. Radium, of course, was omitted again; more marked dysphagia. The ulcer healed soon, but, progress being very slow, it was considered best to have a complete laryngectomy performed. This was done at Mount Sinai

Hospital by Dr. A. V. Moschcowitz. The patient is still alive (six years later).

CASE 9. Mrs. A. W., aet. 63, complains of difficulty in swallowing. (This case is given here as representing a different series of cases.) Status praesens. June 14, 1905. A large tumor is found on the right side of the neck, extending quite a good way back. The interior of the larynx presents a paralysis of the right vocal chord and an infiltration of the posterior wall of the larynx. Undoubtedly the upper portion of the esophagus is affected. The case is evidently one of malignant disease of the neck, affecting also the esophagus and larynx.

Although in a case like this there was absolutely no hope of a cure, we desired to give the patient the benefit of radium treatment, and began immediately. After two exposures, the patient could swallow easier. The voice gradually became stronger, and hoarseness finally disappeared. July 5th, the patient could swallow solids and felt better. July 15th, she complained of pain on the left side, and small ulcers were found, probably caused by the continued use of radium. It was therefore discontinued, and the ulcers as well as the pain disappeared in a few days. After that, however, she began to grow worse; fever set in and she discontinued treatment. In this case there is one point of importance, viz., the greatly improved facility of taking food. Before taking treatment the patient had swallowed food only with the greatest difficulty; but after its use she could take even solid food. The relief, however, was only temporary and the cancer ran its deleterious course.

One of the most striking cases on record is the one demonstrated by me before the Section of Laryngology of the New York Academy of Medicine, on October 23, 1907. The history of the case is as follows:

CASE 10. S. S., aged forty-eight years; peddler. Family history negative. Has never had any serious illness, never any venereal disease. Status praesens: About nine months ago the patient began to experience a pressure in his throat on the right side whenever he spoke. This increased and very soon the patient applied for treatment. On examining the throat, an irregular mass of tissue was observed, springing up from the right tonsil and extending from between the pillars of the

fauces to the base of the tongue. It bled profusely when touched. The patient had some difficulty in swallowing, and felt pressure in his throat when speaking. His voice was muffled. There was absolutely no sign of any present or previous syphilitic affection. This was corroborated by a well-known dermatologist, who examined the patient several times. A microscopic examination of a piece of the tissue was made and the growth was found to be a roundcelled sarcoma. From the very first, the patient was given potassium iodide in ascending doses up to 80 grains, three times daily, and later on, inunctions. This was kept up for six weeks in order to positively eliminate the diagnosis of syphilis, but there was absolutely no diminution in the size of the tumor. On the contrary, it rapidly increased in size, so that the interspace between the pillars and the base of the tongue up to the median line was finally filled up by the mass, which was larger than a pigeon-egg. No view of the larynx could be obtained, as the mass concealed the entire epiglottis. As the antiluetic treatment showed no results whatever, the only thing left to do was to remove the mass by an operation, but as all my former cases of sarcoma of the tonsil had died very shortly after surgical intervention, I was not much inclined to have this patient operated upon, nor did he himself much care to undergo an operation. So we exposed him to emanations of radium for ten minutes at the first sitting, for twenty minutes at the second and later for thirty minutes, using 10 milligrams of radium, of 1,000,000 strength. From the moment the radium was applied the retrogression of the neoplasm was so striking that it could not fail to attract notice. I watched the case with my four assistants and a good many other colleagues who happened to visit the clinic. After the first application, a part of the mass sloughed away, and after 18 applications only a fragment remained. That also disappeared very soon, but we continued the seances in order to be positive. The patient was perfectly cured, and today, four years after the operation, is in good health.

Reviewing these cases and all the others treated with radium but not mentioned in this paper, one question is paramount, viz., What has been accomplished by radium?

Before answering this, some details of the treatment have to be mentioned. How are the neighboring parts protected?

I do not protect them at all, for several reasons. First, in these special parts—in the nose, nasopharynx and the larynx—every particle of space is needed, and it is impossible to cover the tube with extra sheets of tin foil or the like. Second, we may suppose that a malignant neoplasm affects also the neighborhood of the growth with which we have to deal. No deleterious effects have been observed from exposing the apparently healthy parts to the rays of radium, excepting occasionally an ulcer which healed quickly. The length of the exposure has been determined by the tolerance of the patient. Even in the pharynx many patients cannot at first hold the radium for more than a few minutes, and to hold it in the nasopharynx requires considerable intelligence and good will on the part of the patient.

Case 4 was almost forced by his wife to come for treatment, and it was difficult to make him hold the tube in his mouth. As he could not grasp the idea of our treatment, he once asked me: "It is not salt, it is not pepper; what is it?" On the other hand, Mr. P. (Case 5) managed to keep the tube in his nasopharynx for as much as two hours and a half. Of course, most patients are desirous of assisting the physician in that respect. A coughing spell or an irritation in the throat, however, may interrupt the treatment at any time, and it happens frequently. That is the reason why such odd times have been given above for the treatment—as twelve minutes, one hour and ten minutes, etc.

What dose shall be given? That depends upon the tolerance of the patient, as just mentioned, and on the reaction produced by radium. After a twenty minute exposure, the writer has seen an edema in the pharynx develop, so severe that there was some dyspnea noticeable. That disappeared under ice, etc., but it warned us not to be too bold in the beginning. The superficial ulcers occur, especially over the soft palate. They, too, heal rapidly, if radium is left off for a time. For these reasons we have to feel our way, and gradually grow bolder with the radium. The less the reaction, the more we push the radium. If, for example, it is applied on the outside of the neck and there should be a big tumor present, we may proceed more rapidly, all danger of an edema or dyspnea being eliminated. Case 4 thus carried the radium tube for 5 and even 6 days uninterruptedly!

The action of the rays of radium on malignant diseases, including tuberculosis of the larynx, seems to be of such a nature that granulations first spring up. These break down, and more or less pus is evacuated, leaving a large ulcerative area in its stead. This heals occasionally very soon, without even leaving a scar. That procedure we have noticed over and over again, and could only compare it with a gumma that breaks and disappears under K. I. This springing up of granulations, with or without edema, has caused the writer to give up radium treatment in almost all cases of intrinsic carcinoma of the larynx. Unless such a neoplasm be very small, no patient can hold the radium in his larynx long enough to produce an effect, while at the same time the danger of an edema, etc., is present. Under such conditions, it is more advisable and safer to do laryngectomy. That was done in the case of S. G. (Case 8), six years ago, and the man is still living. The plan the writer intends to pursue in the future in cases of intrinsic carcinoma of the larynx is to do thyrotomy, remove all diseased tissue and then apply radium. Or if thyrotomy should be rejected by the patient, an intubation tube might be constructed that would hold the radium in situ at the same time permitting free respiration.

The action of radium rays on the skin is somewhat different. It there produces excoriations, blisters, ulceration, necrosis, and finally cicatrization. In general, we may say that the local action of radium is one that retards the physiologic functions, and in large doses is destructive to the tissues.

What have been the results of our therapeutic efforts with radium?

The most gratifying results were achieved in epithelioma of the skin, but even in more malignant diseases the results are occasionally extremely satisfactory. Take, for example, the man with the sarcoma of the tonsil (Case 9). That patient was cured with very little effort—no loss of blood, no inconvenience; simply applications of radium and cure. That case shows brilliantly the best results obtained with radium, and proves that occasionally it is of invaluable service to us. But take some other cases, as that of the girl with sarcoma of the superior maxilla (Case 2), or Case 5, the tumor in the nasopharynx, etc. Are they not of enormous value to us? Do they not show us that some cases formerly considered hopeless,

can be cured by radium? I say purposely some, because we can never tell beforehand whether or not a given case will yield to such treatment. For that reason it is our duty to try radium first.

Cases of very malignant cancerous growths have not been sufficiently tried to justify an expression of opinion, but it may be said generally that the more benign the disease the more readily it yields to radium treatment; the more malignant, the less.

In conclusion, permit me to state that every one of the cases reported in this paper have been seen and followed up by other physicians, and cannot be pronounced as colored by the writer's enthusiasm. The good results that we have obtained demonstrate that the scepticism of many physicians toward radium is unwarranted, and that radium will have, and has already taken, a place in our therapeutics.

PLATE I.

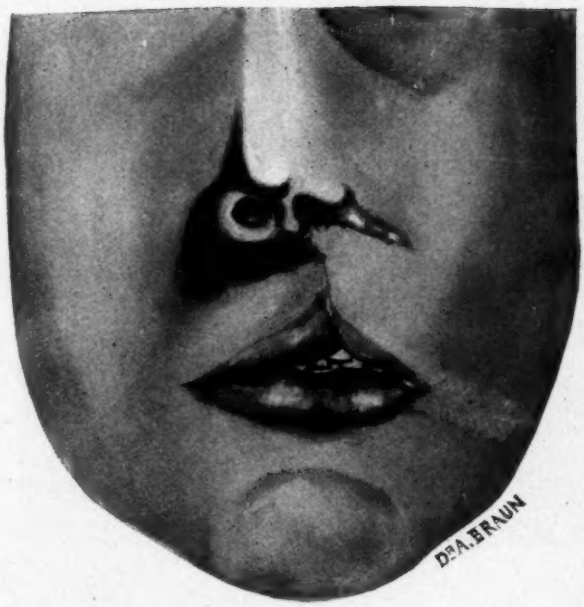

PLATE II.

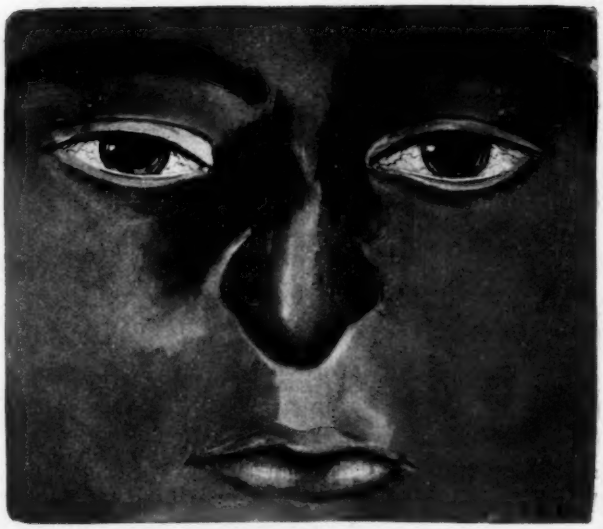

PLATE III.

PLATE IV.

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PLATE V.

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II.

THE EXAMINATION AND TREATMENT OF THE NASOPHARYNX AND EUSTACHIAN TUBE BY AID OF THE NASOPHARYNGOSCOPE.

By E. M. Holmes, M. D.,

Boston.

It has been known for years that the great majority of ear diseases, both acute and chronic, originate in the nose and nasopharynx and extend from here through the Eustachian tube into the middle ear, and in many cases into the mastoid cells. Until now it has been very difficult to examine the posterior portion of the nose and the nasopharynx during life. It has been practically impossible to examine the Eustachian tube by vision, and direct examination of the tube has been possible only in the few cases of cleft palate, congenital or traumatic, and in cases where syphilis or trauma has destroyed the nasal septum and turbinates. In all of these cases we have a Eustachian tube which is subjected to unusual conditions and we cannot expect to find normal appearances.

The small mirrors for use behind the palate have been of service, but everyone who has used the postnasal mirror knows that in the most favorable cases it will not enable him to view the lumen of the Eustachian tube, nor can he see the movements in and about the tube during deglutition. In the majority of the cases the postnasal mirror gives only a poor picture of the deep recess of the fossa of Rosenmueller. It never, so far as I can learn, has shown the opening into the sphenoid cavity; and rarely indeed has it given any definite idea of the condition of the upper surface of the velum palati which is continuous with the floor of the Eustachian tube.

The various pharyngoscopes have given very distorted pictures and have been able to give these only from the same view-point as the postnasal mirror.

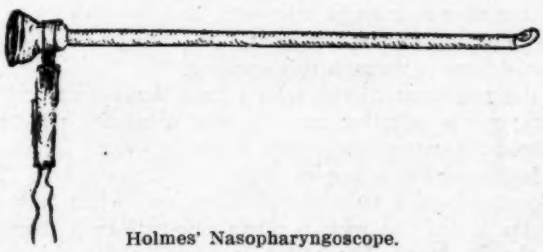
The examination of the nasopharynx, by some modification of the cystoscope, has been tried at various times by passing the tube of the instrument through the nasal cavity. All of these attempts have given little success in diagnosis, because, as far as I can find, none of the instruments were of proper construction for this special use.

Three months ago I began experimenting with the small female cystoscope. My aim was to use the scope in one side of the nose for inspection and to use the other side of the nose for passing operating instruments, hoping by these means not only to see diseased conditions in and about the Eustachian tube but by the guidance of vision to direct the instruments for their treatment. I at first met with the same poor results obtained by others. I found that with the instrument as then constructed I could get only a very imperfect picture of the Eustachian tube, if any at all, and in no case could I get a view of the fossa of Rosenmueller or of the posterior epipharynx. It seemed fully as important to be ab'e to see the fossa behind the tube as to see the tube itself, and as the posterior superior wall of the epipharynx is the site of much of the adenoid tissue, that too is of importance.

By experiments upon the living and by measurements upon the cadaver I found that the fenestra of the instrument I was trying was too great a distance from the tip. The prismatic angle was not right and the lamp was too long. I therefore ground off 4/16 of an inch from the end of the lamp socket and deepened the socket an equal amount. I then had a short lamp constructed, and with these changes I had produced an instrument which would do all I had hoped for as far as inspection was concerned. I found, however, that the cystoscopic eyepiece and handle were too large to permit of easy manipulation of operative instruments which have to be passed through the opposite nostril and are therefore parallel to the tube of the scope. It was a simple matter to reduce the size of the frame about the eyepiece and to make a lighter handle. It was found that a prismatic lens could be placed nearer the tip of the instrument than the prism, and I therefore substituted this lens for the prism.

We have now an instrument which I have named the nasopharyngoscope, which weighs about one-half that of the small female cystoscope. It can be inserted through the nose into

any nasopharynx into which we can pass a small Eustachian catheter, and by advancing and rotating the instrument when in place, we can examine the whole nasopharynx, the upper surface of the soft palate, the lumen of the Eustachian tube, the posterior portion of the nose and in many cases the opening into the sphenoid cavity. The field is sufficiently large to include the Eustachian tube, the space between the anterior lip of the tube and the turbinates and Rosenmueller's fossa, with its posterior border behind the tube. With this large field the nasopharyngoscope need not be moved while operating upon any area in or about the tube. The movements in and about the Eustachian tube during deglutition are observed and studied with perfect ease as the instrument causes no pressure upon the tube or any of the muscles which move it. We can distinguish all degrees of color from marked



Holmes' Nasopharyngoscope.

anemia to pronounced inflammation. We have found degrees of swelling from a slight puffing of the mucous membrane to one so marked as to practically obliterate the lumen of the Eustachian tube. In some cases the appearance has simulated that of edema seen in the larynx. Adhesive bands and growths in the lateral fossae are found and removed under the guidance of vision. I have removed one polypoid growth nearly as large as an orange seed which was attached to the floor of the Eustachian tube. It was so far within the tube that I could see it only by the aid of this instrument. The growth is now being examined by a pathologist and will be fully reported later. We have seen another lymphoid mass on the floor of a tube, but not so far within the tube as the one I removed.

Before passing the nasopharyngoscope the nose is anesthe-

tized with cocain. The tube of the instrument is then guided through the inferior meatus. It should rest upon the floor of the meatus at the side of the nasal septum. The fenestra is kept pointing upward until it has passed the posterior border of the septum when it is rotated toward the opposite side of the epipharynx from which it enters. This brings the Eustachian tube upon that side into perfect focus without distortion. By rotating the fenestra toward the side in which it enters, the Eustachian tube on that side can also be seen, but not as perfectly as the other. By directing the fenestra upward the roof and posterior wall of the epipharynx are brought into view, and when the window looks downward the upper surface of the soft palate is within the field. Behind the palate a picture of the larynx, reduced in size, comes into view. With the fenestra pointing upward and slightly withdrawn from the nasopharynx the posterior portion of the nose is brought into view, and in many cases the sphenoid opening can be made out. In several cases we have seen pus dropping through this opening.

For the treatment of the tube I have devised several applicators; one is of rather heavy bronze wire with a flattened tip to hold the cotton fibre when wound upon it. The other end is fashioned into a loop to fit the end of the thumb. This is enclosed within a vulcanite catheter, and when fully extended the tip of the wire is about one-half inch from the tip of the catheter. The cotton is wound about the tip of the wire, making the end olive shaped. This is soaked in any solution to be used and is drawn within the end of the catheter. Here it remains until the tip of the catheter has been carried to where we wish to make the application, when with the thumb the wire is advanced within the catheter and the application is made. By withdrawing the wire the cotton tip is again brought within the catheter and the whole can be easily removed from the nose.

Another applicator is made from a double heddle wire and is very light and flexible. The tip of this is fashioned like a flat hook. The cotton fibre is teased out and caught between the hook and body of wire; then very carefully wound so as to make a perfect olive tip. This cotton tip cannot be removed without burning or cutting and can be carried through the whole length of the Eustachian tube. In cases where

there is stricture of the tube I employ what I have successfully used as a bougie for several years. It is made of steel piano wire and is so wound at the shank as to form a measure, so that it is possible always to tell the distance of the tip from the end of the catheter. The tip is fashioned similar to the applicator. If the cotton is well wound it forms a tip that conforms to the lumen of the tube at the point of stricture and here exerts a steady pressure, but without trauma if carefully used.

I have devised various curettes which can be used not only in the Eustachian tube but in Rosenmueller's fossæ. I have also made a universal forceps with cutting edge which is sufficiently strong to remove adenoid tissue, adhesion bands and mucous polyps from within and about the tubes.

After practice it is as easy to use these instruments under the guidance of the nasopharyngoscopic view as it is to operate in the larynx by the aid of the laryngeal mirror.

In the case of a badly deflected septum or large septal ridge it would of course be impossible to pass the operating instruments through the obstructed side, but in such a case some nasal operation would be indicated for reasons other than passing our instruments. After relief of the nasal obstruction such a case can be treated as any other.

During the past five weeks we have treated at the Boston Dispensary eleven cases of acute secreting inflammation of the middle ear with pronounced bulging of the membrane tympanæ by applying cocaine and adrenalin, followed by a 15 per cent solution of argyrol directly to the Eustachian tube. In only two cases did we fail to give relief. In one case the pressure was not diminished and we had to perform paracentesis of the membrane. In the other case there was temporary relief, but the patient did not return upon the following day, as she was directed. There was severe pain beginning the second night, followed by rupture during the night. In all of these cases applications were made under the guidance of vision and in a number of cases we could see secretion coming from the Eustachian tube after having used the treatment. The majority of the cases showed as marked relief as usually follows puncture of the drum membrane. Two of them were relieved by a single treatment, but in the majority of them we made at least four or five applications before the cure was complete.

In most of these cases the mucous membrane in and about the Eustachian tubes was much swollen and injected. It had much the appearance of the pharyngeal walls during an acute inflammatory process. There was also almost always the same excess of mucus and in some of the cases a purulent secretion was present.

We have relieved a number of cases of chronic middle ear inflammation. Several of these patients had been given general treatment for long periods with little if any relief. There were four in this class who were not given even temporary relief by inflation, but they made marked progress under treatment of the tube.

There was one woman who had suffered constantly with vertigo for ten months. It was at times very severe. The tests for labyrinthine disease were negative. The right membrana tympani was more hazy than normal. The left was considerably retracted and more opaque than the right. The hearing was

R	28	33	31	36	8	
	C	C^1	C^2	C^3	C^4	Web R< L
L	13	18	20	24	8	

The right Eustachian tube was apparently normal, the left tube was swollen and dark red in appearance. This patient gave a history of a number of inflations without apparent improvement. Like in many of the other cases we began treatment of the inflamed tube, but without much expectation of improvement. Every second day I made application to the tube by passing the cotton-tipped bougie soaked in argyrol. After five treatments, or at the end of ten days, the patient could walk and look down without being dizzy, and she has remained free from symptoms until now, a period of two weeks.

We have been treating a number of cases of old suppurative middle ear disease, but although several cases have shown improvement in the appearance of the Eustachian tube, we cannot feel positive of any improvement upon the suppurative process.

Dr. F. P. Emerson and Dr. H. J. Inglis have seen and, with me, watched the progress of most of the cases I am reporting, as all except one of them were Boston Dispensary patients. We have tried not to be influenced in our findings by too

much enthusiasm; and by having two or more observe each case we have somewhat removed personal error.

We have been for so short a time applying treatment to the nasopharynx and Eustachian tube under direct inspection that we are not in a position to draw definite conclusions, nor have we time in this preliminary report to go into detail in these few cases we report. We realize it will take many months of study to learn some of the less marked pathologic changes found in and about the Eustachian tube, and the effect of these conditions upon the middle ear. It will also require the careful study of a large number of cases before we can know the best methods of treatment, and with such treatment the probable prognosis. The most important of all are the final results upon the middle ear complications. For the symptoms of nasopharyngeal and Eustachian diseases are of little importance when compared with those of middle ear disease.

What we can do is to see with the eye the condition of the whole epipharynx and Eustachian tube and to treat the pathologic conditions found both medically and surgically under the guidance of vision.

The past six weeks' experience at the Boston Dispensary and with our private patients has convinced us that much can be accomplished.

How much remains for all students of rhinology and otology to help us demonstrate.

Drawings made of cases seen at the Boston Dispensary:

1. Normal tube.
2. Adenoid tissue in Rosenmüller's fossa.
3. Inflamed tube nearly closed lumen.
4. Polypoid growth attached to the floor of the tube.
5. Granular tissue (probably adenoid) extending over cushion and int othe lumen of the tube.
6. Bands in Rosenmüller's fossa.
7. Posterior end of lower turbinate resting upon anterior lip of tube.
8. Marked inflammation of tube (strawberry appearance).
9. Nasopharyngeal growth pressing upon posterior wall of tube (symptoms of tinnitus and dizziness for three months).
10. Very large adenoid in 7-year-old boy.
11. Pus coming from right sphenoid cavity.

12. Band running from posterior border of septum and joining anterior lip of the tube.

13. Tube lacking the usual cushion floor.

14. Bands across Rosenmüller's fossa.

15. A much swollen tube in a case of acute purulent otitis media.

16. Posterior turbinates, two openings in superior meatus.

17. Very patulous tube. Contact between anterior lip of Eustachian tube and inferior turbinate.

18. Growth low down in Rosenmüller's fossa.

19. Pus dropping from mouth of tube in a case of chronic mastoiditis.

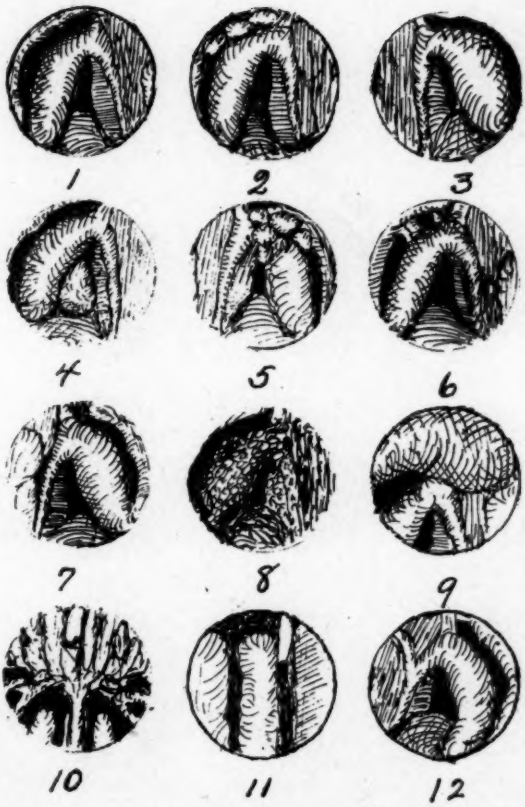
20. Lymphoid mass nearly filling fossa and covering cushion of tube.

21. Polyps at posterior end of middle meatus.

22. Large polyp in epipharynx covering tube.

23. Right tube in case of sagging right membrana tympani.

24. Left tube in same patient as 23. The left ear was normal.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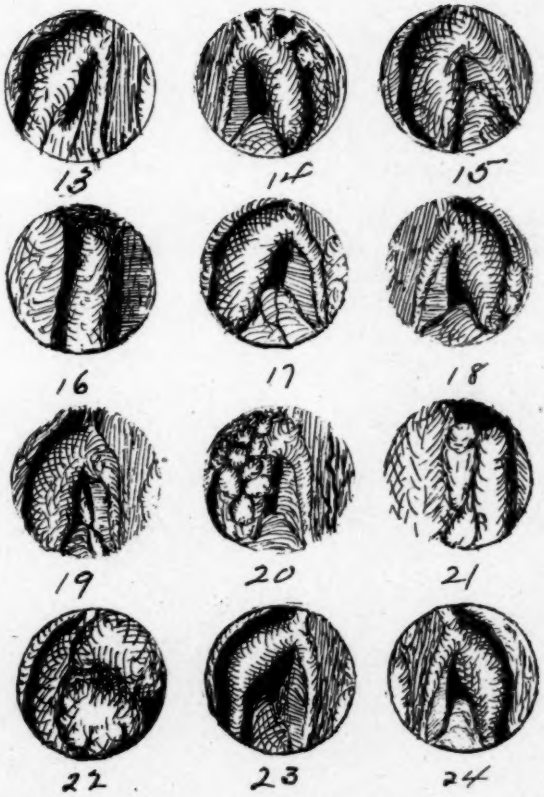
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III.

THE ELECTRIC NASOPHARYNGOSCOPE.

By Francis P. Emerson, M. D.,

Boston.

Through the kindness of Dr. Holmes I have had the opportunity of using the nasopharyngoscope in my office daily for a month, and with him have observed and can verify his findings, in the cases reported from the clinic. Briefly summarized we can determine the following:

First. The condition of the mucous membrane, *i. e.*, (a) atrophy, (b) hypertrophy, (c) congestion, (d) enlarged blood vessels, (e) secretion.

Second. Conditions of Rosenmüller's fossae that cannot be detected by the posterior mirror or the finger.

Third. The mobility of the Eustachian tube and the changes within its lumen for approximately five-eighths of an inch, as well as conditions anterior to the Eustachian eminence.

Fourth. The size and appearance of the posterior ends of the middle and inferior turbinates and the lateral walls of the posterior nares.

Fifth. In about 40 per cent of the cases the sphenoidal opening, with occasionally a posterior ethmoid cell.

Sixth. Lateral enlargements of the vomer.

Seventh. The interior of the larynx (although this is more difficult and less satisfactory).

Eighth. The posterior pharyngeal wall.

In 1907 the writer stated in a paper published in the Annals of Otology, Rhinology and Laryngology, that, given a case of unilateral deafness with fluctuating hearing, recurring salpingitis and tinnitus, there were always pathologic conditions in the fossa of Rosenmüller. This we have verified, and also that the congestion passes over into the Eustachian tube, particularly along its posterior-superior and superior walls.

In an angular fossa there may be bands and considerable tissue that cannot be detected by the finger, or lymphoid tissue may hang over into the lumen of the tube. Such conditions may hold the tube as in a vise. On the other hand, the wide excursion of the tube, when free, during deglutition is very striking. The changes in the tube, even in catarrhal adhesive ears, with progressive deafness, and with no symptoms of nasopharyngeal catarrh, have been almost constant.

In suppurative otitis media and chronic secretory ears, this condition has varied from congestion of the upper lip to actual edema. Within the tube the membrane may present localized or general congestion, atrophy or hypertrophy. Bands or polypi may be present. The lumen may be filled with serum, mucopurulent or purulent secretion, or its walls encroached upon from the fossa of Rosenmüller or the posterior ends of the turbinates. In one case a woman of 65, the duration of whose symptoms extended over a period of years, during which she was regularly catheterized, clear pus in considerable quantity was discharging through the tube. Very active and constant factors in keeping up a salpingitis outside of focal suppurations have been the glandular ends of the turbinates, which may be discharging directly into the open tube. These hypertrophies may extend into the nares and their size cannot be determined by posterior rhinoscopy as they are clearly seen with the nasopharyngoscope.

The writer believes this instrument to be a valuable addition to our armamentarium, not in the treatment of the exceptional case, but in the daily routine of office work, and that chronic infection of the Eustachian tube must be regularly sought and treated as part of the care of the nasopharynx in progressive deafness.

IV.

HISTORY OF A CASE OF CEREBELLAR ABSCESS PRESENTING CERTAIN FEATURES SUGGESTIVE OF LABYRINTHINE SUPPURATION; DIFFERENTIAL POINTS; OPERATION; RECOVERY.

By Philip D. Kerrison, M. D.,

New York.

The following case is reported on account of certain clinical features which should interest equally the otologist and the neurologist:

L. A., a girl of 16 years, had suffered from bilateral suppurative otitis media since early childhood, both drum membranes being practically destroyed. She had experienced the usual infectious diseases of childhood, the past history being otherwise negative as to conditions bearing upon the aural lesions.

On February 9th, 1910, when first seen by the writer, she presented, in addition to the symptoms characteristic of chronic bilateral middle ear suppuration, the physical signs of an acute inflammatory process involving the right mastoid. Her temperature at this time was 100.4° F. She gave a history of having been dizzy at times during the past three or four days, but showed no disturbance of static equilibrium, and walked with normal ease. She exhibited at this time moderate physiologic nystagmus when the eyes were rotated to the extreme lateral position in either direction. She complained chiefly of pain referred to the right mastoid, which also was exquisitely sensitive to pressure. The patient presented the appearance of greater illness than is usual in cases of mastoiditis of average severity. She was, therefore, admitted to the Manhattan Eye, Ear and Throat Hospital and prepared for immediate operation.

*Read before the Section on Otology, New York Academy of Medicine, November 11, 1910.

Operation, February 9th, right mastoid. Removal of the cortex disclosed a diploeic mastoid in the acute hemorrhagic stage of inflammation. But little fluid pus was found, elsewhere than in the antrum, until the sigmoid sinus was exposed, when a small perisinous abscess was encountered. The sinus was uncovered over about three-quarters of an inch of its length. The mastoid cells were next converted into one cavity by removal of the posterosuperior wall of the bony meatus, and the bone operation completed by the steps usually followed in a radical mastoid operation. Owing to the finding of pus in contact with the sinus wall, the posterior wound was left open.

During the four days following the operation the patient seemed to be free from pain or discomfort. She slept well at night, took the usual amount of nourishment and presented the appearance of a patient reacting favorably after operation.

On February 14th and 15th (fifth and sixth days after operation) she complained of headache and slight dizziness. Examination of the eyes showed absolutely no nystagmus when the patient looked directly in front of her, but moderate rotary nystagmus when the eyes were voluntarily rotated to the extreme lateral position in either direction; the quick eye movement always changing to correspond with the direction in which the eyes were turned. In type it corresponded to the so-called physiologic nystagmus. During this time the temperature ranged near the normal line, with two moderate rises, the highest being 101° F.

On February 17th, two days later, she complained of severe frontal headache and had one attack of unexplained vomiting.

During the next three days the temperature remained practically normal, and the patient, though complaining of moderate headache, seemed in good condition.

On February 20th, while dressing the wound, I applied the caloric test, using first cold and then hot water, and obtained not the slightest reaction. The hearing, however, carefully tested with the aid of the Barany noise instrument, proved surprisingly acute.

On February 23rd, the patient complained of severe frontal headache and dizziness, and had one attack of vomiting, unaccompanied by nausea. She still exhibited rotary nystagmus

when the eyes were turned strongly in either lateral direction, but the nystagmus to the right was now altogether stronger and more prolonged than that following voluntary rotation to the left, which lasted but a few seconds. From her statements, even the strong nystagmus to the right seemed absolutely without influence upon her subjective symptoms. Getting the patient to stand, for the purpose of testing her static equilibrium, her subjective vertigo was increased and, had she not been supported, she would have fallen to the right. This reaction was frequently retested throughout her illness, and was constant—i. e., she fell, or without support would have fallen, always to the right. Lying in bed she now exhibited well-marked incoordination ataxia of the right hand, as shown by the difficulty in bringing her right forefinger promptly and accurately to the tip of her nose. It was about this time that she developed a peculiar speech defect, or lisp. Her mentality throughout the disease was perfectly clear, and she showed always rather unusual command of the right words to express her meaning, but the words themselves came slowly, thickly and with effort. She was herself conscious of this defect, commenting upon her difficulty in bringing the words out.

On February 28th, when Dr. Zabriskie kindly examined the patient with me, her condition presented the following additional features, showing disturbed orientation or muscle sense in the right side of the body:

Winking: Patient can wink both eyes. She can also wink left eye singly, but she cannot wink right eye alone. When she tries, always both eyes wink.

Rotation of wrists: Told to rotate both wrists as rapidly as possible back and forth, she performs what to the normal individual is rather a difficult feat—i. e., the left wrist rotates quickly while the right rotates very slowly—the left wrist executing about four rotations while the right rotates once.

Piano playing: Practicing the finger movements upon a book, her left fingers move rapidly, as with any normal person, the right following with similar movements, but very slowly.

Trying to touch the tip of her nose alternately with right and left forefinger, the left forefinger is brought to the nose

with quickness and precision; the right only after a series of to-and-fro oscillations in the vicinity of the face.

The effort with eyes closed to bring the tips of the right and left forefingers together, gave the following results: Holding the right forefinger stationary above her chest, she had no difficulty in bringing the left into quick and accurate contact with it. Reversing this—i. e., holding the left forefinger stationary—she could bring the right forefinger into contact with it only after a series of to-and-fro oscillations in its immediate vicinity.

On March 3rd the eyes were examined for fundus changes by Dr. Wootton, and found normal.

Analysis of Symptoms.—To epitomize, the important symptoms in this case were: Subjective vertigo; rotary nystagmus corresponding to the direction in which the eyes were turned, but stronger and more prolonged to the right; loss of caloric irritability in the right ear; disturbance of static equilibrium, the patient falling always to the right; and evidences of disturbed arthrodial and muscle sense in the right side of the body.

Three of these symptoms—viz., the vertigo, nystagmus and loss of caloric irritability—while in some respects atypical, suggested the possibility of a labyrinthine lesion. It seemed possible that certain contradictory features might be the result of a double lesion—i. e., an infection reaching the cerebellum by way of the labyrinth. Such a diagnosis, if confirmed, would have called for an operation upon the labyrinth as well as upon the cerebellum.

Disease of the labyrinth was at length definitely excluded, upon the following grounds:

1. A suppurative lesion of the labyrinth of sufficient severity to annul caloric irritability would almost inevitably have involved the cochlea and produced deafness, usually profound. The hearing in this case was remarkably good.

2. A suppurative lesion of the labyrinth causing loss of caloric reaction would give rise to rotary nystagmus toward the opposite ear. In this case the nystagmus was most pronounced and prolonged toward the diseased ear.

3. With nystagmus to the right, caused by a labyrinthine lesion, the patient would have fallen to the left. This patient fell invariably to the right.

4. With active nystagmus and vertigo resulting from labyrinthine disease, the direction in which a patient falls is always influenced by the position of the head. This patient fell to the right, irrespective of the position of the head.

Labyrinthine disease having been definitely excluded upon the above considerations, the diagnosis of cerebellar abscess seemed fairly positive.

Second operation, March 6th, 1910. The wound resulting from the first operation was at this time filled with firm and apparently healthy granulations. This granulation tissue was carefully removed with a curette, and the wound again reduced to the condition of the primary operation at the time of its completion. The exposed sigmoid sinus was again outlined. The anterior aspect of the cerebellum was next uncovered by the removal of bone in front of and internal to the sinus. This when completed exposed a triangular surface of cerebellar dura, bounded above by the tegmen antri, and in front and behind by the petrous bone and sigmoid sinus respectively. The wound was now resterilized and an effort made to reach the abscess through this exposure. A narrow blade knife was introduced in two directions—first inward and slightly backward, and then in a more backward direction—but failed to reach the abscess. This wound was therefore lightly packed with sterile gauze, and an exposure of the occipital surface of the cerebellum made by the removal of bone behind the sinus. In this way a dural surface of the size of a silver dollar was uncovered. The second incision of this exposure—the knife being carried inward and forward—was followed by the escape of about a dram and a half of fluid pus.

No effort was made to further explore this tract. The encephaloscope was not used. The knife was held in position slightly rotated until pus ceased to flow, and a small wick of folded sterile gauze was then introduced in the direction in which the knife had passed. Application of a large dressing of sterile gauze completed the operation.

The favorable influence of this operation upon the patient's condition was almost immediate. The following bedside history note by Dr. Moore, the house surgeon, made on March 8th, two days after the operation, describes the rapid relief of symptoms: "Patient comfortable; no nystagmus; ab-

solutely none with eyes turned to right; a few quick movements follow rotation of eyes to left. There is no incoordination ataxia in movements of right hand—i. e., she can bring right forefinger to nose about as quickly as left."

During the postoperative period the wound was dressed daily. Though the change of dressing was on one occasion attended by a flow of a half dram of pus, no effort was made to introduce a wick or drain to the bottom of the abscess cavity, the effort being simply to keep open, without injury or infection of the dural or cerebellar tissue, the pathway of escape already established. I believe that persistent adherence to this plan was an element influencing the successful issue in this case.

The temperature chart is omitted for purposes of brevity. The temperature curve was of a type so often seen in abscesses of the brain—going occasionally a little below the normal line and occasionally somewhat above it. The highest recorded temperature either before or after the operation was 101.4°F.

The patient was discharged as cured on May 10th. So far as I know, this is the only recorded case in which a cerebellar abscess was the direct cause of a loss of caloric irritability. The caloric test was repeated in August last, and there was no return of vestibular irritability. The hearing was still surprisingly acute.

58 West 56th Street.

V.

A REPORT OF A FEW CASES OF OTITIS MEDIA SUPPURATIVA TREATED WITH SUSPENSIONS OF LACTIC ACID BACILLI.*

By W. H. Haskin, M. D.,

New York.

Early in 1909 the writer became much interested in the many reports of the successful use of these suspensions in many diseases of the nose and decided to try their effect on some very intractable chronic suppurations in ears which had not responded to other methods of treatment and yet would not submit to operation. My associate, Dr. Dwyer, had made many examinations of smears and cultures to try to isolate some one characteristic bacterium, or even group of bacteria, in order to make a suitable vaccine with which to treat them.

This proved to be impossible, as many of the worst cases did not show the presence of bacterial growth. In others streptococci, staphylococci, diplococci, pneumococci, etc., were found and many other germs also, but none could be said positively to be the actual cause of the suppuration. It was noted that the bacillus pyocyaneus was frequently present.

The paper of Dr. C. E. North gave so many reports of cases benefited by this treatment, I wrote to Schieffelin & Company, and they very kindly furnished me ample supplies of massolin, which they described as: "A pure culture of the bacillus bulgaricus (a lactic acid producing bacterium described by Massol) in a medium adapted for introduction into the nose and throat. Indicated in the treatment of suppurative conditions."

As it is a well known fact that the growth of the lactic acid bacillus in culture media will destroy the growth of a great many putrefactive and pathogenic bacteria, we decided to try it, as there could be no harm done. The results have been

*Read before the Section on Otology, New York Academy of Medicine, November 11, 1910.

so marked in most cases, it may prove interesting to report a few of them that we were able to follow. Some cases did not show improvement, but we felt that the instructions had not been carefully followed out, because the majority showed such marked improvement. The majority of the patients on whom we used massolin were what might be said to be exaggerated cases, several having been assigned to me with their cards marked for probable radical operation. They included cases with polypi, perforations with edges granulating and very thickened mucous membranes throughout the tympanic cavity, caries of the ossicles and of the attic wall.

We used it also in several cases of acute suppuration, using no douching, merely wiping the canal dry and then applying a cotton tampon saturated with the culture every two or three hours, and the results have been excellent.

We have applied it in several cases on whom radical operation had been performed, but there still remained a most offensive secretion. As we have not had the clinic cards of these patients, we have, unfortunately, no records of these cases other than memory, but we feel that no other treatment has given the same amount of benefit to them than the proper use of this culture.

The writer does not pretend that this is a cure-all, but earnestly recommends its trial in a great many cases, even of acute cases, and especially in private practice where one can secure its proper administration. The success of this treatment depends upon a free use of the solution, which should be given ample time to insure contact with the diseased area, at least fifteen minutes being none too short a time. This cannot be obtained by merely swabbing the canal. As Dr. Holbrook Curtis says, there seems to be some substance in the solution which acts upon the vasomotor system and reduces turgescences and even hypertrophies in a marked manner, as has often been noted in affections of the nose, such as acute colds and hay fever. The writer believes that this action is due, not to the lactic acid produced by the growth of the bacillus in its culture media, as suggested by Dr. North, but to the presence of an enzyme, this being produced by the growth also.

When one notes the rapid change for the better which so often occurs, the disappearance of the odor, the restoration

of membranes to a healthy condition and the cessation of discharge, is it not well to give the patient the opportunity of trying this treatment before resorting to the heroic radical operation, with its risks, and frequently unsatisfactory end results, especially on hearing?

Granting that the discharge may return, this is generally due to a secretion from the eustachian tube which the operation recently described by Dr. Sidney Yankauer will probably cure better than any method yet attempted. The treatment of the eustachian tube is so frequently neglected in these cases, the writer would suggest that medicaments may easily be driven through the tube by means of the Siegle otoscope and great relief be promptly obtained in many of them.

As I have stated before, in order to secure results a reasonable length of time should be allowed for the solution to exert its influence and a sufficient quantity should be used. The following instructions should be given to the patients and explained to them: First, to syringe the canal carefully with a warm saline solution and wipe dry. The patient should then lie down with the diseased ear up and the canal be filled with the solution, which should be left in the ear for at least fifteen minutes before wiping it dry. When this method has been carried out, at first twice daily and then once a day, there has invariably been marked improvement in a few days' time. Simply swabbing the ear does not produce the results expected, which leads one to wonder whether it is not true that the enzyme produced by the growth of the bacillus does actually play a very important part in securing the benefits derived from the solution.

It is also important that fresh cultures be used in order to get the active bacillus. If left too long the growths appear to kill themselves and then the enzymotic action will not be present, nor will you have the activity of the growing bacillus and no results will be obtained. These cultures can readily be made in any laboratory and should easily be obtained.

40 East 41st Street.

No.	Name	1st visit	Age	Disease	Duration	Condition	Previous treatment	Massolin	Results
1	J. C.	6-21-09	11 yrs.	O. M. P. C. (B)	2 yrs.	Very offensive, profuse discharge.	6 mos. No benefit	2- 4-10	5 visits. Ears dry and no odor.
2	A. D.	2-23-10	60 yrs.	O. M. P. C. (S.)	years	Polyp. Offensive secretion.	Removed polyp. No benefit from previous treatment.	2-23-10	2 weeks. Ear dry and no dizziness.
3	J. F.	8-15-10	24 yrs.	Old radical	O. M. P. C. Op. 4 mos. ago	Cavity full of offensive secretion with granulating surfaces.	8-15-10.	8-15-10	3 weeks. Ear clean and dry.
4	B. H.	4- 6-10	4 yrs.	O. M. P. C.	3 yrs.	Free and foul discharge. Mastoid tenderness.	No benefit.	4- 6-10	Much improved on 3rd visit. Disappeared.
5	O. H.	12-20-09	20 yrs.	O. M. P. C.	15 yrs.	Drum destroyed. Foul secretion. Mastoid tender.	.....	12-20-09	2 weeks. Ear dry, no tenderness or odor.
6	W. H.	11- 9-09	6 yrs.	O. M. P. A.	2 wks.	Small perforation. Membrane red and thick. Profuse pus.	.....	11- 9-09	Marked improvement in 4 days. Then disappeared.
7	A. J.	3-18-10	40 yrs.	O. M. P. C. (S.)	12 yrs.	Polyp. Offensive discharge.	No benefit.	3-18-10	Oct. 27-'10. Ear has remained dry. Polyp gone.
8	A. K.	2- 9-10	24 yrs.	O. M. P. C.	2 yrs,	Profuse, offensive discharge. Mastoid tenderness 5 days.	.....	8- 9-10	Seen only 3 times. Pain gone. Much better.
9	M. L.	12-15-09	52 yrs.	O. M.P. C. D.	years	Large polyp. Excessive foul discharge. Radical advised.	No improvement.	12-15-10	Removed polyp. Wrote Oct. 27-'10. Much better, no discharge. Hearing bad.

10	J. M.	11-20-09	24 yrs.	O. M. P. C.	years	Offensive secretion.	No. benefit.	12-20-09	Ears so much improved in 2 weeks he ceased coming.
11	D. M.	12-29-09	19 yrs.	O. M. P. A.	1 wk.	Pain and bloody discharge. Small perforation.	.....	12-29-09	One week. Ear dry and no pain.
12	L. R.	12- 6-09	19 yrs.	O. M. P. C.	13 yrs.	Granuloma. Offensive pus. Pain at intervals. Radical advised.	.....	12- 6-09	Odor ceased in 2 days. Nov. 1-'10. Slight tubal secretion, otherwise well.
13	I. S.	12-19-09	9 yrs.	O. M. P. C.	3 mos.	Profuse discharge.	No. benefit.	12-19-09	Under treatment 2 weeks. Wrote Oct. 8-'09, ears well.
14	T. T.	11- 8-09	21 yrs.	O. M. P. C. (l.)	6 mos.	Foul free discharge. Radical advised.	No benefit.	11- 8-09	After 10 days, odor and discharge ceased and membranes appear healthy.
15	B. B.	.....	11 yrs.	O. M. P. C. (l.) Double radical	8 yrs.	Both cavities foul.	No benefit.	.....	No benefit.
16	M. J.	10-12-10	39 yrs.	O. M. P. A. Mastoid	3 days	Severe pain. Discharge. Mastoid wound very painful.	Ice coil and hot douche gave no relief.	10-16-10	Ear improved immediately and was well in 3 days. Patient left hospital.
17	M. B.	11-14-10	7 yrs.	Mastoid operation	1½ yrs.	Deep wound has never entirely healed.	No benefit, although treated for 1½ years.	10-14-10	In four days wound absolutely dry and clean. Epidermization complete.

VI.

A CONSIDERATION OF THE PATHOLOGIC CONDITIONS OF THE EAR RESULTING IN PROFOUND IMPAIRMENT OF HEARING.*

By Edward Bradford Dench, M. D.,

New York.

A profound impairment of hearing either may occur at birth or may be the result of some pathologic condition occurring after birth. This pathologic condition occurring after birth may be either hereditary or acquired.

It is impossible, in the short time at my disposal, to go very deeply into the histologic conditions which are found in the labyrinth in cases of those profoundly deaf. As I have done no original work in this line, I should simply be quoting from other observers, and it is much better for me to refer my hearers to the classical work of Denker ("Die Anatomie der Taubstummheit," Wiesbaden, 1904-1909), than to attempt to give here a resume of their work. What I shall attempt to do, in the time allotted to me, is to bring out a few points which may be of clinical importance, and to dwell very lightly upon the exact pathologic changes which occur in these cases.

In those who are born deaf it seems probable that intermarriage is one of the most common causes of congenital impairment of hearing. This impairment may appear in the first generation or may skip one generation and appear in the next. Consanguinity has, however, for a long time been recognized as a common cause of congenital deafmutism. In some of these congenital cases we have extreme deformity of the external ear, absence of the external auditory meatus and, in some cases, malformation of the tympanic cavity. The labyrinth is found poorly developed, the cochlea being incomplete in some of its portions. Partial or complete obliteration of the semicircular canals may also occur. In another class of cases of those

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congenitally deaf, we find faulty mental development. Faulty mental development, however, by no means occurs in the majority of cases of congenital deafmutism. Many of these patients are bright, mentally, and their sole defect seems to be their impairment of hearing. Among acquired conditions, meningitis in early life is, perhaps, the most common cause of deafmutism. Syphilis also plays a part, not only in the congenital form, but in the acquired form of those profoundly deaf, although it is probable that a specific taint is much less commonly a causative factor than was formerly supposed. A suppurative inflammation of the middle ear sometimes leads to profound deafness. To this variety belong those cases of panotitis, of the older writers, in which, as the result of a suppurative process, usually following one of the exanthemata, not only were the structures within the middle ear largely destroyed, but also portions of the labyrinth as well. Profound impairment of hearing, however, as the result of suppurative middle ear disease, is not of very common occurrence. Labyrinthine hemorrhage may also cause a profound impairment of hearing. This condition either may result from traumatism or may be dependent upon a degeneration of the walls of the labyrinthine vessels, due to an arteriosclerosis or to specific disease either of the hereditary or acquired form.

Of the conditions which cause profound deafness in adult life, probably invasion of the labyrinth secondary to or coincident with middle ear disease, is the most common. I here refer to cases of otosclerosis.

With reference to otosclerosis, it seems to be a mooted point at present, as to whether the labyrinthine changes in this disease, occur per se, or whether they are secondary to middle ear involvement. I am well aware that many consider otosclerosis a condition which develops simultaneously in the labyrinth and in the middle ear, and that the labyrinthine affection is never dependent upon middle ear involvement. From a clinical point of view, I am hardly ready to accept this statement. I am inclined to believe that in quite a large proportion of cases the labyrinthine changes are secondary to the pathologic conditions within the tympanic cavity.

When we come to the consideration of the pathologic conditions which are present in cases of profound impairment of hearing, we may divide them into cases in which middle ear

changes are present, cases in which labyrinthine changes are present, and cases in which changes in the auditory nerve trunk occur.

The changes which may occur in the middle ear, in the congenital conditions and in many of the acquired conditions, are, first changes in the ossicular chain. We may have a rigidity of the ossicles, this rigidity usually occurring as the result of an osseous deposit in or about the oval window or in the niche of the round window. More rarely, we have fixation of the incus, as in the case reported by Nager ("Anatomie der Taubstummheit," Dritte Lieferung, Wiesbaden, 1906), in which there was a synostosis between the incus and the internal wall of the middle ear.

Similarly, Alexander and Neumann ("Die Anatomie der Taubstummheit," Sechste Lieferung), report a case of deafmutism in which the tympanic cavity was practically obliterated by a new bony growth. In this case, there were also extensive changes, both in the cochlea and in the auditory nerve. In this case, also, the hammer, anvil and drum membrane were entirely wanting, and the stapes was rudimentarily developed. In the cochlea there was a new deposit of bone in the perilymphatic spaces and also in the vestibule. There was a new deposit of connective tissue and of bone in the cochlea. There were also changes in the aqueductus cochleæ, and in the utricle and saccule. There was also degeneration of the auditory nerve, both in its vestibular and cochlear branches. The changes occurring in the middle ear and labyrinth, in the congenital cases, may perhaps be somewhat understood by this report of the case of Alexander and Neumann.

A careful study of the cases in Denker's masterly collection of monographs on the subject of deafmutism, shows that in all cases of this character, extensive changes have been found in the cochlea and in the auditory nerve trunk, together with certain changes in individual cases, in the middle ear. It is a notable fact that in every instance where extensive changes have taken place in the end organ of the auditory nerve, the auditory nerve trunk itself has shown pathologic alterations either in the cochlear or vestibular portion, or in both.

The changes which occur in the middle ear may be either a faulty development of the ossicles or adhesions between the ossicles themselves, or between the various elements of the

ossicular chain and the adjacent tympanic walls. Again, we may have the deposit of new bone in the middle ear, this occurring usually in the neighborhood either of the oval or round window, preferably in the former location. Such a deposit of new bone leads to fixation of the stapes and causes impairment of hearing on account of the inability of the ossicular chain to transmit sonorous vibrations to the column of fluid in the labyrinth. In certain cases, particularly in otosclerosis, this deposit of new osseous tissue is not confined to the outer wall of the labyrinth, that is, to the middle ear, but we find a deposit of newly formed osseous tissue both in the vestibule, the cochlea, and in the semicircular canals. Such a deposit of new bone gives rise to various symptoms, according to the location of the deposit. In otosclerosis, as this newly deposited bone occurs most frequently in the neighborhood of the oval window, the earliest symptoms of the disease are characterized by evidences of rigidity of the ossicular chain. Low tones are poorly perceived, bone conduction is increased, and as soon as the newly formed bone has been deposited within the labyrinth, the upper tones are usually poorly perceived. This for the reason that, owing probably to the free circulation in the lower turns of the cochlea, in contradistinction to the relatively poor vascular distribution in the upper turns, the newly formed bone is deposited most frequently in the lower cochlea turn, which is concerned in the perception of the higher tones of the musical scale. The regular occurrence of this symptom, in cases of socalled progressive deafness (or otosclerosis), seems to me to be a strong argument in favor of the supposition that the labyrinthine changes may really be secondary to changes within the middle ear, and that were appropriate treatment applied sufficiently early to the middle ear condition, the subsequent cochlear or vestibular condition might not take place. In a certain number of cases that have come under my observation, such treatment has been absolutely futile. In other cases, where there has been abundant evidence that such changes were beginning, local treatment has certainly retarded the progress of the condition.

In certain of the cases of otosclerosis, disturbances of equilibrium may occur. I have seen a number of cases of this kind. One was relieved by removal of the membrana tym-

pani, malleus and incus, with partial liberation of the stapes, while a second was relieved by simple treatment of the middle ear condition by means of regular inflation. In the first case the symptoms were evidently due to an increased labyrinthine tension, caused by a deposit of newly formed osseous tissue, probably in the vestibule. In the second case, the labyrinthine changes were probably merely vascular in nature, and dependent upon an underlying middle ear condition.

While profound deafness, as the result of a suppurative inflammation of the middle ear, is comparatively uncommon, certain of these cases do occur. In the more advanced cases destruction of the labyrinth has undoubtedly taken place as the result of the suppurative inflammation. The avenue of invasion here is most commonly through the horizontal semicircular canal, although the oval and round windows are occasionally avenues of infection. These cases, following suppurative otitis, are usually characterized by some disturbance of equilibrium during some stage of the disease, in addition to the great impairment of hearing, so that, it is only fair to assume that the laybrinthine involvement is fairly extensive.

In some of these cases, however, the cochlea alone is apparently involved. Thus, in one case of double suppuration, in which the loud voice was heard only eighteen inches from the ear—maximum—there was no disturbance of equilibrium, and the rotation test showed a normal vestibular reaction. In cases of this character, the invasion must attack simply the cochlea, while the static portion of the labyrinth remains unaffected. In other cases, however, the entire labyrinth is involved, as evidenced by profound deafness and the failure of the static labyrinth to react to the rotation tests.

A labyrinthine condition which is sometimes seen after the radical operation, and which is probably best described as a perilabyrinthitis, may explain the impairment of hearing in a certain number of cases of chronic suppurative otitis, and may, perhaps, furnish us a suggestion as to the possible benefit of operative treatment in cases of this character. In a number of cases of suppurative otitis which have been subjected to the radical operation, the patients have, at varying periods after the operation, developed a nystagmus on looking either to the affected side or to the opposite side. This nystagmus has varied from day to day, sometimes more pronounced in one

direction, sometimes more pronounced in another. Disturbances of equilibrium have occurred during the period in which the nystagmus was present. All the symptoms have subsequently completely disappeared without operative interference. In these cases, Neumann has made the suggestion that an inflammatory process is taking place in the soft bone overlying the labyrinth capsule. In my own experience, these symptoms have always appeared in cases in which the caries has been so extensive as to necessitate the removal of the bone to the very limits of the labyrinth capsule. It seems to me possible, in certain cases of profound impairment of hearing following middle ear suppuration, that this perilabyrinthitis may be responsible in some instances for the impairment of hearing, and that by resorting to the radical operation and removing the diseased bone, a certain recession of the labyrinthine deafness may be looked for.

My observations upon cases of this character are of comparatively recent date, and no report can be made concerning the results of operative treatment at the present time. It seems fair to assume, however, that in a certain proportion of cases in which profound impairment of hearing follows extensive middle ear suppuration, suppurative process has invaded perhaps not the labyrinth itself, but simply the perilabyrinthine structures.

Whether, in these cases, a serous labyrinthitis results, we cannot say. From the fact that a certain number of cases of this character gradually improve without operative treatment, it would seem probable that the perilabyrinthitis had caused a serous effusion into the labyrinth, and that later, with the subsidence of the acute symptoms, this serous effusion was absorbed. Whether operative interference in some of the more chronic cases, will enable us to deal with this class of cases, surgically, is simply a matter of conjecture. I am inclined to believe, however, that such improvement may be hoped for after a more critical study has been made of cases of this character.

The lesions due to cerebrospinal meningitis, which, as before stated, is one of the most potent causes of acquired deaf-mutism, consist of an inflammation of the auditory nerve trunk, with an infiltration, more or less extensive, of the end organs of the auditory nerve. This infiltration affects usually

both the vestibular and cochlear apparatus, so that, in addition to the profound impairment of hearing, disturbances of equilibrium are exceedingly common. The sense of equilibrium is usually regained after a comparatively short time, but the impairment of hearing usually remains permanent, except in those few cases where it yields to internal medication.

In certain of these cases of cerebrospinal meningitis, in addition to the changes in the auditory nerve trunk and cochlea, we have changes in the aqueductus vestibuli and aqueductus cochleæ. These two channels are either partially or completely obliterated as the result of the meningeal inflammation, and it is fair to assume, in many of these cases, that the labyrinthine involvement occurs through these channels as avenues of infection.

In syphilis the lesion may lie either in the trunk of the auditory nerve or in the labyrinth itself. A differential diagnosis here is sometimes quite easy, as in a case which came under my observation a short time ago, in which, five months after the primary lesion, the patient suffered from profound deafness in one ear, and a decided disturbance of equilibrium. Both labyrinths were proven active by the rotation test. In this case there was spontaneous nystagmus to the affected side. The electric stimulation of the auditory nerve gave a paradoxic reaction. Owing to the activity of the vestibular apparatus on each side, and the fact that the cochlea was apparently intact, as evidenced by normal upper and lower tone limits, and also from the fact that there was a possible paradoxic reaction of the auditory nerve to galvanism, the lesion was located in the meninges, in the neighborhood of the auditory nerve. The patient was put on antisyphilitic treatment, consisting of large doses of iodid of potassium together with mercury internally, and later the hypodermic injection of salicylate of mercury. At the present time, all of the vestibular symptoms have disappeared, and the patient's hearing has become nearly normal on the affected side. In this case, there was undoubtedly a pachymeningitis involving the auditory nerve sheath.

In certain cases of specific disease gummatous deposits have been found in the internal auditory meatus, causing pressure on the auditory nerve trunk.

It is particularly important, in specific cases, to make a diagnosis between involvement of the labyrinth, on the one

hand, and the involvement of the auditory nerve trunk, on the other. The labyrinthine lesions yield best to the administration of pilocarpin, in conjunction with iodid of potassium, while the lesions of the auditory nerve trunk yield most easily to the administration of the antisyphilides in large doses, particularly to large doses of the iodid of potassium, after mercurialization has been established.

In this connection, it might be well to mention Ehrlich's new remedy, "606." In the case referred to, advisability of administering this drug was seriously considered, but in consultation with Doctor Fordyce, it was decided that, owing to the untoward effects which Ehrlich had reported in cases of cerebral syphilis, the administration of the drug was not warranted. The improvement of the patient under the ordinary antispecific medication, seems to have borne out this view.

It would be possible to continue a citation of various lesions causing profound impairment of hearing, indefinitely, did the time warrant. I must remember, however, that I am to be followed by one who is to speak on the subject of "Educating the Eye to Substitute for Deaf Ears," and in closing my paper, I wish to make a few remarks upon this subject.

When should the eye be used as a substitute for the ear in cases of impairment of hearing? Personally, I believe that in every case where the acoustic sense for a moderate whisper is less than five feet, in either ear, the patient will derive considerable benefit from the training of the eye so as to aid the ear. I do not mean by this statement, that the eye should be used as a substitute for the ear, and herein, I think, the advocates of the socalled ocular method have made a serious mistake. As soon as a patient depends more upon his eyes than upon his ears, the auditory function will become more impaired by disuse. When, however, the patient uses his eye as an aid to his impaired hearing, but not as a substitute for his defective auditory mechanism, in those cases I believe not only do the patients receive decided benefit, but the auditory sense will be stimulated. It is only necessary for a normal individual to attend either the theatre or the opera, to recognize how much better he hears when he is seated in such a position as to see the lip motions of the performers, to understand how great an aid the ocular sense becomes to the sense of hearing. The more the hearing becomes impaired, the more

must the eye be depended on. The point which I wish to make is that lip reading should never be taken as a substitute for hearing, excepting in those profoundly deaf. As an aid to hearing, thus relieving the fatigue of an overstrained auditory nerve, I believe it is of great value. If, however, a patient learns to rely more upon the sense of sight, in his intercourse with his fellow beings, than upon the sense of hearing, he not only fails to exercise what little auditory function he has, but, by failing to exercise this function, loses completely his sense of hearing for his own voice. The so-called "deaf voice," formerly so commonly observed in those with profound defect in hearing, will certainly result unless due attention is paid to the preservation of whatever auditory function the patient has. My own belief is, therefore, that a combination of the ocular method, with the conservation and education of whatever auditory function the patient possesses, will give us the best results in the treatment of cases suffering from profound auditory defects.

VII.

A NEW METHOD OF ELICITING THE FUNCTIONAL EAR TESTS. PRELIMINARY REPORT.*

By Edmund Prince Fowler, M. D.,

New York.

Information derived from the functional tests of the auditory apparatus often proves unsatisfactory because of the patient's inability to recognize degrees of intensity in musical notes, and especially slight differences in the perceptive power of one ear as compared with its fellow. Under these circumstances much time and effort is required to elicit any valuable data from the examination. Especially are we liable to meet with difficulties in little children.

The method I bring to your notice depends for its utility on the physical phenomena produced when two notes not quite in unison are heard at the same time. Under this arrangement the resulting sound will be found to alternate between a maximum and a minimum of loudness occurring periodically. These periodical fluctuations are called beats.

To better understand the subject, let us briefly recall a few important facts bearing thereon.

Musical sounds are capable of variation in pitch, loudness and quality.

Pitch depends upon and rises with the number of vibrations per second. Loudness depends upon and increases with the energy of the vibrations reaching the ear, and therefore, on the amplitude of the vibrations of the body whence the sound proceeds. Pitch also influences loudness, for of two notes of equal intensity of vibration, the higher note always exhibits to the ear the greater intensity.

Quality or timbre is a term used to express the difference between sounds emitted under different circumstances, as by

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different instruments, or human voices. Beats are produced by the interference of two sound waves having slightly different periods. It may be easily shown that the number of beats per second is always equal to the difference between the number of vibrations occurring in the same time, corresponding to the two interfering notes. It follows, therefore, that the more these notes are out of tune, the more rapidly will the beats follow each other.

Beats are also produced, though less distinctly, when concords, such as thirds, fifths, etc., are not perfectly in tune.

Beats are very useful in the tuning of musical instruments, especially for the higher notes, for in these the same difference between the number of vibrations indicates greater deviation from perfect unison than it does for two notes of lower pitch. As the number of beats increases, the effect on the ear becomes more and more unpleasant, until it finally degenerates into an irritating rattle. This effect occurs with the middle notes of the musical scale when the number of beats is twenty to thirty per second. The disagreeable impression of beats on the ear is ascribed by Helmholtz to the same physiologic cause to which is due the painful effect on the eye of a faint, flickering light. As in the eye, so also in the ear the receptive mechanism is unable, under the repeated and intermittent stimulation, to lose its sensitiveness in great degree, as normally occurs when continuous vibrations are received. The irritation caused by the same number of beats is much less in the lower register and can even become a pleasing concord. I find that for my tests (using, say the C^1 forks) from two to twelve beats per second best answers the purpose.

Although the twin forks may be used to advantage in nearly all of the fork tests, and in Rinné's, Schwabach's, Gellé's and Weber's especially, I shall consider in this paper its application in but one, namely, Weber's. It is in this test that I first noticed its superiority over the single fork method.

If the pitch of one of two forks, tuned exactly in unison, be lowered by slipping over one of its prongs a small piece of rubber tubing, or moving the overtone clamps, and both forks be simultaneously sounded, bursts of sound will be heard at intervals, and these will increase in frequency as the difference in pitch between the two forks is increased. With these two forks, slightly differing in pitch, one in each hand, we

are ready to apply the tests. Strike one prong of the fork held in the right hand against one prong of the fork in the left hand. (This insures equal intensity to the vibration of both forks.) First place one fork on the vertex and after the patient has fixed his attention and is endeavoring to determine which ear better perceives the sound, place the second fork on the vertex over the lambda. If there is any difference in the perceptive abilities of the two ears, it is surprising how quickly the patient will note it, and inform the examiner.

I have used this test for a long time, and in scores of cases it was impossible to determine on which side Weber was better heard until the twin forks were both vibrating on the skull. In many cases patients can better appreciate the difference between the perceptive ability of the two ears if before the forks are placed on the vertex the ears are closed by a moistened finger and then alternately opened while the forks are vibrating.

The explanation usually accepted as accounting for the increased perception of sound by bone conduction, as in middle ear obstructions and in Weber's experiment, is that any obstruction in the conducting apparatus causes the sound waves to be reflected back into the internal ear, and thus reinforce the vibrations on this side, making them better heard in the more affected ear.

This is very well so far as it goes, but may we not add that one of the reasons for the increased perception in the diseased ear is that the reflected vibrations cause increased perception, not only because they are added as such, but because both the direct and reflected vibrations are more irritating to an ear whose perceptive mechanism is in a state of comparative rest as compared with its more active fellow, and is therefore more sensitive to sound waves, which are conducted to it through the skull with equal or greater facility than to the better ear? This may account in part also for the greater irritation conveyed to the diseased ear by the twin forks on the vertex, for musical beats must be especially irritating to an organ unaccustomed to their influence.

It is also conceivable that thickened folds of mucous membrane and cicatricial or fibrous tissue, etc., may serve as a better conductor of sound from the vertex to the diseased ear than would more normal tissues.

By using the twin forks, not only does the blocked ear receive the increased vibrations from the reflected sound waves, but it receives all vibrations in greater intensity and in periodic fluctuations, which latter, as we have shown, are especially irritating to the auditory nerve, and besides enable slight differences in intensity to be more easily noticed than is the case with even tones. If the vibrating twin forks are held one before each ear of the patient, he can determine more easily which ear hears the better by air conduction, for the presence of the beats is of great assistance.

By using the method described one can ascertain within a few seconds, first, which ear hears the better by air conduction, and, second, in which ear craniotympanic conduction is accentuated. Applying the forks to one's own vertex, and stopping up one ear will give at once a practical demonstration of the experiment.

18 East 58th Street.

VIII.

SARCOMA OF THE NOSE AND NASOPHARYNX.*

By T. H. Farrell, M. D.,

Utica, N. Y.

A. H., aged 46. This man consulted me first August 6, 1906, complaining that "three weeks ago he began to have like a cold in the head"—obstruction to breathing, followed in one week by a four-smelling and foul-tasting discharge.

The right side of the nose was free; the left anterior naris was greatly narrowed by a spur, and was occluded by a mass looking like wet cotton. On manipulation there was persistent bleeding and the probe easily penetrated a movable mass until it felt rough bone on the outer nasal wall. No pedicle could be made out. There was a foul mucopurulent discharge. Several pieces were removed and submitted to a pathologist, who reported sarcoma. The patient declined further treatment, as his breathing was relieved and he did not like the diagnosis.

However, he consulted a cancer specialist, who told him he had a simple catarrh and gave him a solution to be used in a syringe. The third time it was used it brought on a severe epistaxis, which lasted for twenty-four hours and made him willing to submit to operation. On consultation with a general surgeon it was decided to remove the left superior maxilla as the growth did not appear to be pedunculated and the authorities I had at hand stated that sarcoma of the nose usually spread from adjacent structures.

September 10th (five weeks after first visit) Dr. J. H. Glass excised the left superior maxilla with the growth attached. It was a large friable bluish-red mass with a comparatively small attachment in the region of the ethmoid. The antrum was free from disease. The pathologist reported the neoplasm to be a glandular sarcoma.

Healing took place with a fenestrum in the hard palate. This made a convenient window for examination of the

*Read before Eastern Section American Laryngological, Rhinological and Otological Society, in Watertown, January 15, 1910.

left side of the nose, the anterior naris being exceedingly narrow.

Nine months later he began to have recurrences which manifested themselves by epistaxis. These growths were usually pedunculated and the hemorrhage was immediately controlled by severing the attachment.

The recurrences took place from the surface of the posterior ethmoid cells and anterior wall of the sphenoid on left side, then appeared in the same localities on the right side and in Rosenmueller's fossa.

On October 29, 1907 (fifteen months after first appearance), the nasal membranes appeared normal. Five weeks after this a polypoid mass was removed from the left side, the attachment being on the outer wall near the floor. A month later, January 8, 1908, the neoplasm reappeared in Rosenmueller's fossa, with a dark red appearance of the left half of the palate and ethmoid region. All tumefactions were thoroughly curetted.

In six months the curetting had to be repeated, and in August of this year (1908) the left external carotid artery was tied off, but without effect, as another curetting had to be done in September, following which the nasopharynx took on a healthy appearance. The patient was now put on Fowler's solution, but two months later a pink nut-like movable tumor appeared in the right side of the nasopharynx, attached posterosuperiorly to the eustachian tube, while a dark red mass was seen back of left eustachian eminence covered with a foul-smelling grayish discharge requiring the use of creolin in a douche. The pink nut-like mass was snared and sent to Dr. Jonathan Wright, January 22, 1909. He reported as follows: "This specimen is undoubtedly a sarcoma. I should classify it as an alveolar sarcoma. I believe that this class of malignant connective tissues springs from the endothelium, so that perhaps a more appropriate name would be alveolar endothelial sarcoma."

About this time an enlarged gland was noticed in the right side of the neck.

In February, 1909, the soft palate was divided in the median line and the nasopharynx thoroughly evacuated of a large mass og new growth, mostly from left side. Healing took place speedily, with an improvement in the appearance of the membrane covering the sphenoid, but this was only of a short duration.

He now complained of his stomach and began to look cachectic. His general health up to this time had been good, but he now rapidly failed and died about two and a half years after first appearance of growth. It is worthy of remark that the nasal growths were superficial, while those in the nasopharynx penetrated deeply.

J. A. Watson had a most interesting article in *American Medicine* for April 2, 1904, based on a study of 150 cases, including the reports of 49 cases collected by Bosworth and 62 by Gibbs. I have been able to collect 18 cases not contained in the above, besides the one just reported. It would therefore appear that the disease is not so rare as the textbooks suggest.

These nineteen cases comprise nearly all varieties: Unspecified, 4; round cell, 4; spindle cell, 2 and round and spindle cell, 1; lymphosarcoma, 2; chondrosarcoma, 1; angiosarcoma, 1; melanosarcoma, 1; endothelial, 1; fibrosarcoma, 1; alveolar, 1.

As regards the point of origin the middle turbinate and ethmoid is mentioned five times, the base of the cranium once, the septum and floor three times, the inferior turbinate once.

In three cases the maxillary sinuses were involved by extension, and in one the frontal sinus. In contrast to this I have seen sarcoma of the maxillary sinus three times without any involvement of the nasal mucous membranes in any one of them, though the nasal passages were narrowed by pressure.

In respect to sex this series differs from Watson's, in that the more numerous are females, there having been eleven females and ten males.

The general view that sarcoma is a disease of youth is confirmed by this series. There were five cases in the second decade, four in the third, two in the fourth, one in the fifth, two in the sixth and four in the seventh. Thus it appears there were eleven occurring before forty and seven after.

The question of diagnosis is generally an easy one. The neoplasm is as a rule yielding, friable and vascular, though the fibrosarcomas may be dense and hard. The color varies considerably. In this series nasal stenosis occurred in practically every case and usually early; pain is mentioned in seven cases and epistaxis in six cases, though it is probable that hemorrhage occurred more frequently, and is the second most common symptom. Exophthalmos occurred in four of these nineteen cases and swelling of the cheek and nasal bones in five

cases, though these are late manifestations. Offensive purulent discharge is a distressing concomitant.

The microscope is a valuable aid in confirming the diagnosis, and when positive should make us doubt clinical evidence of benignancy. On the other hand, Raoult's case illustrates how the histologic examination may declare for nonmalignancy and yet the disease run a characteristically fatal course.

The occurrence of metastasis is rare. In my own case there was one small cervical gland enlarged, which may not have been sarcomatous. In Braislin's case there was a general infection of the subcutaneous lymphatics. In no other case was it mentioned.

In the large majority of these cases surgical treatment was the only one relied upon, though benefit is claimed from X-rays in one, injections of adrenalin solutions in another and yellow oxide of mercury ointment with an alkaline spray in still another. In none of them does the treatment by toxins seem to have been instituted.

The percentage of cures by external operation have been unusually large, viz., three out of five. In nine cases submitted to internal operations recovery occurred four times, recurrence or death four times, and the result was unknown in one.

The extended experience I had with the one case would prejudice me in favor of intranasal operation. A radical antrum operation would have accomplished quite as much as the excision of the maxilla. It was remarkable how often the nasal growths had a small pedicle and how infrequent recurrences were at these points.

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IX.

A CASE OF CARCINOMA OF THE PINNA AND EXTERNAL AUDITORY CANAL.

By Hugo A. Kiefer, M. D.,

Los Angeles.

The patient, J. N., male, age 48 years, miner by occupation, presented himself to me July 13, 1910. For two years past the left ear had been discharging pus and blood for variable periods, with intermissions, when there would be no discharge whatsoever. The last attack of the running of the ear lasted for two weeks, and had not yet ceased when he presented himself to me. He said that he had likewise had periods of bleeding from the left nostril, and that this condition had started even before the ear became sore. Both conditions, according to his idea, started with a cold. During this period of two years he had treated with a number of physicians, using a variety of washes and salves. But in spite of all these treatments the condition continued to grow worse.

When he presented himself to me, practically the whole area of the inner surface of the tragus, antetragus, concha, and the external auditory canal to within ¼ cm. of the tympanic membrane, were almost entirely denuded of epithelium, and the swollen, roughened cartilage was exposed to view. Granulations were scattered thickly over this area, and bled very freely to the touch. A small amount of thin pus was also present, mixed with the blood. The margins of the affected area were red and somewhat elevated, irregular in outline, but not undermined. An area of infiltration extended a mm. or two beyond the line of demarcation. Pain was only occasional, and when present it was in the nature of a sharp, pricking pain.

On the whole the condition resembled very much some cases of eczema, except for the free bleeding, and this, associated with the fact that the patient was not overanxious to be put

under an anesthetic, led us to try the effect of palliative treatments, though the tentative diagnosis of carcinoma had already been made. Accordingly the entire affected area, which was practically insensitive, was lightly curetted, and the application of a 2% silver nitrate followed. Daily thereafter there was made one application of a similar strength of silver nitrate, and several douches of boric acid, and corrosive sublimate one to ten thousand. In the course of several days' treatment, however, there was no sign of any improvement, and it was therefore determined to anesthetize the patient for the purpose of obtaining a specimen of the tissue for microscopic examination.

Accordingly on July 19, 1910, under a general anesthetic, two pieces of tissue were removed, one from the concha, the other from the auditory canal, each bearing a portion of the healthy skin outside the line of demarcation, as well as a portion of the diseased cartilage. These specimens were submitted to Dr. E. L. Leonard, who returned a report of "malignant sarcoma, probably originating in the ceruminous glands."

The patient submitted himself to operation July 25th. An incision was made through the entire circumference of the soft tissues of the canal ¼ cm. from the tympanic membrane, by means of a small knife, with the blade bent at right angles on the flat. The skin of the back of the ear was incised throughout the entire length of the fold formed by the helix and concha, and dissected free from the underlying cartilage as far as the temporal bone. An incision was then made through the healthy skin on the anterior surface, following the ridge formed by the concha with the helix, tragus and antetragus, and this incision was deepened so as to pass through the entire thickness of all the cartilage encountered until the blade met the temporal bone all around. Bleeding, which was quite difficult to control, was stopped by passing catgut sutures through the soft tissues and underneath the proximal ends of the bleeding vessels. The bell-shaped piece of soft tissue forming the concha was then raised, and the soft tissues of the canal were separated from the bony wall by means of dull elevators, so that the entire mass was lifted out of the canal, leaving the bare bone exposed to within ¼ cm. of the tympanic membrane, which was uninjured. The parts were then flushed with saline solution, antiseptics not being used in order to avoid any interference with the growth of the skin grafts. Four strips of

skin, each measuring 1¾ inches in length by ⅛ inch in width, were now taken from the thigh and laid longitudinally along the external auditory canal and the other denuded portions, and were held in position by means of a light packing of gauze soaked in sterile saline solution. This dressing was left undisturbed for five days. Inspection now showed the grafts in place, but they had the appearance of possibly being dead. However, they were left in place two days more, making seven days in all, and were then removed, being dead. But by this time nice granulations were springing up all over the denuded area of bone.

On August 9th the patient was again anesthetized, and four more strips of skin, the same size as the former, were taken from the thigh and laid the same way in the canal, and held in place by a gauze trailer soaked in boric acid solution. This was left undisturbed for two days, and then was cleansed daily with 25% peroxide of hydrogen solution, followed by normal saline solution, and packed lightly with the boric acid trailer. Bichloride moist dressings were not used till August 16th, for fear of injuring the grafts, which had a splendid, healthy appearance. A few days after this date, on account of a little exuberance of granulations, occasional applications of tincture of iodine were made, which reduced them nicely. On August 19th a small bleeding area was noticed on the helix, about ½ cm. beyond the operated region. This was curetted and cauterized with 10% silver nitrate, and the same procedure was followed on the next day.

On August 29th the patient was discharged, the entire operated area being healed and beautifully epithelialized, with no deformity resulting, nor even any scarring except such as would be revealed by close inspection. Hearing had been undisturbed by the operation, and apparently also not disturbed by the growth.

Though strict injunction had been laid on the patient to report at once any sign of soreness returning in the ear, a letter received from him recently made no mention of any such thing occurring.

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X.

EDUCATING THE EYE TO SUBSTITUTE FOR DEAF EARS.*

By Edward B. Nitchie,

New York.

It is well known that the blind in a measure substitute hearing for sight; sounds of traffic in a busy street are a confused roar to the untrained ear, but to the experienced blind man they are a fairly reliable guide on his way. Even to a greater degree can the deaf man train his eye to substitute for his deaf ears. If you will watch my mouth as I am speaking now, you will see many clearly defined movements of the lips, perhaps even of the tongue. The eye trained to associate certain movements with certain sounds has the power of interpreting these movements into words and sentences.

A very large percentage of the deaf are, I believe, incurable, at least at the present state of medical and surgical knowledge. The greatest loss to anyone who is deaf is the loss of understanding speech. Inability to hear music or the voices of nature is a deprivation; but inability to hear spoken language is a calamity, unless other means than the ear can be found to convey the message to the brain. For in the ability to understand spoken language lies the way not only to the pleasures of life, but to the truest necessities of soul and body. Deafness is a physical bar to employment second only to blindness, and bears especially heavily on the man who, dependent on others for his salary, becomes deaf in adult life. Lip reading, or speech reading, "that subtile art," as Dr. John Bulwer said in 1648, "which may inable one with an Observant Eie to see what any man Speaks by the moving of his Lips," is a valuable substitute for hearing, as far as spoken language is concerned, though like any other substitute it has its limitations.

*Read before the Section on Otology of the New York Academy of Medicine, December 9th, 1910.

By it the sense of sight is forced to interpret a medium for expressing thought which, throughout the history of the race, has been developed for the needs of the sense of hearing. I shall show later how imperfectly spoken language is fitted to the requirements of successful lip reading.

The problem of the teacher varies according to the class of the deaf to which his pupil belongs, for the deafmute's needs are only in part the needs of the hard-of-hearing. My work lies with the hard-of-hearing—and by that term I mean those who, either partly or totally deaf, become so after having acquired speech and language—and it is of their problem of which I shall speak particularly. It is not only their problem; its solution becomes also the solution of the problem of the deafmute after he acquires speech and language.

With the deafmute, speech, language, and lip reading go hand in hand; ability in one grows as it grows in the others. The language and speech which a deafmute child must be taught through the senses of sight and touch, the hearing child absorbs naturally, without conscious effort, through the ear; and in addition, the deaf child must be taught to "hear with the eyes," a task never set for the normal child.

The language problem is not only a question of vocabulary; it is also the problem of grammatical forms and construction and of idiom. The speech problem involves a knowledge of the formation of the different sounds, constant practice in the use of them, and accent, tone, and rhythm. We who gain our speech through the ear do not have to be taught these things; probably nine out of ten of us have no more idea of how we use or move the organs when we speak than we have of how we digest our food.

Some deafmutes have a more or less rudimentary sense of hearing, which can be developed by aural or auricular training. How much the hearing can actually be increased is a question, but at least a more accurate conception of the sounds, of accent, tone and rhythm can be inculcated than through oral training alone.

The problem of lip reading for the deafmute is in many respects that of the hard-of-hearing, but is made much more difficult for him by reason of his limited vocabulary. As soon, however, as a good vocabulary is acquired and as soon as he is no longer "mute," then his problems in reading the lips and

those of the hard-of-hearing are much the same. The hard-of-hearing of course do not have the problem of speech and language.

I have entitled my paper "Educating the Eye to Substitute for Deaf Ears"; more correctly it might be "Eucating the Mind, with the Help of the Eyes, to Substitute for Deaf Ears." For the problem of teaching lip reading is truly a psychologic problem. Both the eyes and the mind must be trained, but mind training is the more important factor.

The difficulties for the eyes to overcome are two: First, the obscurity of many of the movements, and second, the rapidity of their formation. That spoken language is not well adapted to the purpose of lip reading is evident from the many sounds that are formed within the mouth or even in the throat. The difference between vocal and nonvocal consonants is absolutely invisible to the eye. The aspirate *h*, as in "hat," cannot be seen; there is no visible difference between "hat" and "at." The consonants formed by the back of the tongue and the soft palate, *k*, hard *g*, *ng*, are seldom revealed to the eye of the lip reader; likewise, certain tongue consonants, as *t*, *d*, and *n*, and *y*, present almost insuperable difficulties. Double tongue consonants, as *nt*, *nd*, *lt*, *ld*, are also just as indefinite and obscure in their visible formation. See the result: The following words —watch my mouth as I say them—are not only difficult, but also, because their consonants are practically invisible, and because the vowel is the same in each, are in facial appearance almost as alike as two peas: End, egg, Ed, hen, head, held, yet, yen, ten, tent, tend, Ted, debt, den, dead, dent, dealt, net, Ned, knelt, deck, neck, get, ken, Kent, keg. Twenty-six of them! And this is not all, for long *a* is hardly distinguishable from short *e*, so that to the twenty-six we will add: Ate, eight, aid, ache, hate, hailed, taint, Dane, date, nailed, take, gate, gait, gain, gained, Kate, cake—seventeen more, making forty-three words which the eye unaided has the greatest difficulty to tell apart. If the lip reader were making over the language he would cast all these difficult consonants into limbo, and along with them some of the more difficult vowels, as short *i*, long *e*, short *e*, long *a*, and short *u*.

Rapidity of the movements is another serious difficulty in the way of successful lip reading. From 1/12 to 1/13 of a second is the average time per movement in ordinary speech. This is

the average, but some movements are of course slower, while others, particularly those for unaccented syllables, are much quicker.

With such difficulties as these, the wonder is that anyone can read the lips at all. Eye training can never eliminate them, though it can lessen them in a measure. The method should aim first always to study or see the movements in words or sentences, not formed singly by themselves. Sounds pronounced singly always tend to be exaggerated, and many of them even to be grossly mispronounced. Moreover, one movement often modifies decidedly the appearance of another connected with it in a word. For example, long *e* usually tends to show a slight drawing back of the corners of the mouth, as in "thief," but after *sh*, as in "sheep," this is rarely visible.

In the second place, the method should aim always to study or see the movements as the words are pronounced quickly. It is true that it would be easier to see them when spoken slowly, but it is also true that to produce the best results the eye should be trained from the first to see things as they must always be seen in ordinary speech, and that is rapidly.

And in the third place, the method should aim to inculcate a nearly infallible accuracy and quickness of perception of the easier movements, leaving to the mind in large measure the task of supplying the harder movements.

With the eye thus trained it often happens that the lip reader's impression is that of actually hearing what is said. If I put the tubes of a phonograph into my ears, so that I can hear every word, and close my eyes—unbidden and without conscious effort—the vision of the moving lips of the speaker forming the flow of the words passes before my mind.

Although it is not possible for the eye to see each and every movement, it is possible for the mind to grasp a complete impression without even the consciousness that it has "supplied" so many of the movements and sounds. The chief difficulties in the way of the mind in lip reading may be indicated by describing that type of mind which is uniformly most successful, and that is a mind which is quick to respond to impressions, or quick in its reaction time, and a mind in which the synthetic qualities are dominant. The difficulties then are to overcome the opposite conditions or tendencies, and the aim is to develop the mind to the utmost along the line of these favoring conditions.

Fortunately thought is quicker than speech. Testing myself with a selected passage which I know by heart, it takes me fifteen seconds to think of it word by word, and thirty-five seconds to read it aloud. To develop quick perception, practice is the essential; that is, slow speech, word by word utterance, must be avoided, and all forms of exercise must be given to the pupil to the limit of speed which his ability to understand will allow. This undoubtedly makes the work harder for the time being, but it results in more rapid progress.

Not only is thought quicker than speech; thought need not formulate every word to have clear conceptions. Thought skips; thought looks ahead and anticipates. So that a correct understanding of an idea is possible without a word for word accuracy. That is the way the baby understands what is said to him. I will say to my little boy, a year and half old, "How does daddy shave himself in the morning?" That he understands every word is not possible; probably "daddy" and "shave" are the only ones he really knows. But that he understands what I say he makes evident when he goes through the motion of shaving his own face with his finger.

The method of mind training should aim to develop this power of grasping thoughts as wholes, and to avoid strictly anything that will enhance the opposite tendency of demanding verbal accuracy before anything is understood at all. There are many minds of the latter type; they are literal, analytical, unimaginative. Yet there are very few who are altogether of this kind; most of us, however analytical, have some synthetic powers, some ability of putting things together, of constructing the whole from the parts, of quick intuitions. It is by developing these powers that real success in lip reading can be attained. And it is by working along these lines that the surest way is found in the end to the understanding of every word. Even you who hear, often have an experience like this: Someone will make a remark which you fail to understand; the word "What?" is on your lips, but before it is fairly uttered the whole sentence will come to you like a flash. When this intuitive, synthetic power is already highly developed, the "natural born" lip reader is the result. I feel sure, from what is known of the men, that Prescott, the historian, would have easily learned lip reading, while the analytical Bancroft would have found it much more difficult; that Seton Thompson would

be quick to master it, and that John Burroughs would be slower; that Roosevelt would be an expert, and that Hughes would be a novice. I have repeatedly found among my pupils that those who can play music readily at sight are apt in reading the lips, for such ability implies both quick reaction time and the intuitive mind.

I develop the synthetic qualities in my pupils by various kinds of exercises. For the homophonous words, such as the list of forty-three which I have mentioned, I give sentences containing the different words, compelling the mind to insert the right word according to the thought of the sentence. For example, in the sentence, "Did you have a soft-boiled egg for breakfast?" egg is the only possible word from the entire list that fits the rest of the thought. Or take the sentence, "Will you — me a drink of water?" If I say that inaudibly, supplying the missing word, "Will you get me a drink of water?" who would not know the right word to select from the forty-three?

Other means of developing the synthetic qualities are by the use of conversation, stories and lectures, coaching the mind to grasp the idea even if words are lost; by telling stories in one form and then repeating the same thought with entirely different wording; by asking questions to which the pupil replies if the thought is understood even if many of the words are lost.

Does not this mean guesswork? Yes, but a trained and intelligent guesswork that knows how to act along the line of the natural associations suggested by the word or words that have been understood. Guesswork cannot be entirely eliminated, but it can be guided; and it is by such guidance that lip reading becomes feasible for ordinary colloquial utterance. If dependence is had only upon eye training it tends to compel a necessity for slow, word by word speech, and exaggeration or "mouthing."

What degree of skill can a lip reader expect to attain? And how long does it take? These are natural questions, but cannot be answered categorically. What some can attain in three months others cannot acquire short of a year; and the highest degree of skill, as in any art, is open only to the few. But three lessons a week for three months will with most pupils give a very satisfactory and practical skill. I may be par-

doned if I speak of myself. I can sometimes understand a lecture or sermon, depending upon conditions of light, of the subject, of the speaker's mouth and manner, etc.; less often can I understand a play. I am called a good lip reader, but I know better ones.

With very few exceptions, such a degree of skill is possible to everyone as to make home life and social friendships a joy once more, and though it may not be an infallible resource in business, it may for all be an invaluable aid. Lip reading can never do all that good ears ought to do, but what it can do is almost a miracle.

Two objections to lip reading I occasionally hear from physicians: (1) That it is too great a strain on the eyes; and (2) that by relieving the ears from hearing, there is a tendency to deterioration from lack of exercise.

The strain upon the eyes at first is truly no small one. But I have repeatedly found that those who complain of eye strain during their first lessons, later never think any more about it. I have not very strong eyes, and now, though I use them in reading the lips every day and all day long, they seldom are overtired. If the lip reader is careful from the first to cease using the eyes at the first symptom of tire, I believe that no harm can result, and gradually the eyes will be able to do more and more.

The objection in regard to the deterioration of hearing I believe to be the reverse of true. Dr. Albert Barnes, in *The Dietetic and Hygienic Gazette* of a year ago last October, said: "People with ear strain should spare the hearing as much as possib'e, and instead of straining the ear to catch what is said they should watch the lips more. In other words, the eyes should be called upon to help the ears." Moreover, with pupils who have enough hearing to hear the sound of the voice I advise and encourage them to use ears and eyes in fullest cooperation, one helping the other. Under such circumstances, and also in view of the fact that the ear involuntarily gets exercise with every sound that comes to it, whether the strain to hear is made or not, I do not—speaking as a layman—see how any harm can be done to the ears by lip reading, and in all my experience I have never found any evidence of such harm. On the contrary, several times pupils have reported to me an actual betterment of the hearing, though how much

lip reading had to do with it and how much other conditions, I do not pretend to say.

Lip reading then is not a cure for deafness; nor is it even a cure for all the ills of deafness. But from some of the worst ills it is a true alleviation. It takes first place on the majority of occasions over all mechanical devices. For those completely deaf, or so deaf as to make mechanical devices out of the question, lip reading is the only resource. For those whose deafness still allows them to hear the sound of the voice, it obviates the necessity of using these more or less cumbersome and inconvenient contrivances. Even at such times when these devices can be used to advantage, watching the lips helps to make them more useful and reliable. Under any circumstances, lip reading has in it the power to make deafness of whatever degree much easier to bear.

XI.

THE IDEAL CLINIC IN LARYNGOLOGY.

By Arthur J. Huey, M. D.,

New York.

The treatment of diseases of the nose and throat is carried on to a greater extent in an out-door clinic, without the aid of hospital facilities, than any other clinical division of our profession, with the single exception of dermatology. At the same time the clinic in laryngology, without exception, requires more elaborate equipment and more careful organization for its successful and satisfactory operation than that of any other specialty. A short study of the difficulties met in the running of such a clinic may therefore be of interest to those who are trying to overcome them.

Equipment.—The proper "housing" of the clinic with regard to economy of space and ease of operation first demands our attention. While this will of course depend largely upon the routine to be followed and the space at our command, the most practicable division is to provide three rooms, if possible, with an additional small dark room for transillumination.

The first room is used for taking the history and making the primary examination of new cases. In order that the examination may be thorough, it is essential that it should be conducted systematically and amid as little confusion as possible. This is best accomplished by this part of the work being done by one physician and a nurse. The room may be comparatively small, containing sink, sterilizer, table and light for physician, and desk for nurse, at a convenient distance for her to take down dictation of conditions found. With a litt'e care the position of the desk can be so arranged as to allow the nurse to take the personal history of the patient previous to the examination without changing her position.

The second room should be entirely for the treatment of old cases. Each member of the staff should have his own table or booth, the sink, sterilizer, instrument cabinet and writing desk may be conveniently used in common.

The third room should be an operating room, where a general anesthetic may be given when desired. The nearer this room approaches the ideal hospital operating room in equipment the better. In addition it should be provided with an operating chair, properly screened from the rest of the room, where the longer operations under local anesthesia may be performed. Whenever the operative cases are numerous, adjoining narcosis and recovery rooms are of great convenience in handling the cases.

The dark room contains a transillumination apparatus. It may be of small size, and should open off of the room for the examination of new cases (if impossible to have it connect with both rooms).

The selection of instruments and furniture for the clinic is too large a subject to enter into in a paper of this length. Let me suggest, however, that the instruments should be supplied by the clinic. The practice of requiring each member of the staff to bring and use his own instruments, as followed in some institutions, never works well. It often happens that an assistant does not own the best instrument for the purpose, or if he does it is not on hand when wanted. It is much better to have at the clinic a complete outfit of useful instruments, carefully selected by the physician in charge. This adds materially to the expense, of course, especially to the running expenses, when the cost of repairs and new instruments is counted in, but the results are well worth the outlay. The advantages of a card system of records are so well recognized that they need but to be mentioned.

Staff.—The staff should consist of an attending physician with as many assistants as necessary, a clinic nurse, and if the operating room is to be used during clinic hours, a second nurse to assist at operations is necessary.

Routine.—A carefully arranged routine should be established and strictly followed. This not only increases the interest of the staff, but also adds greatly to the efficiency of the clinic, doing away with confusion and neglect. The routine must be arranged to suit individual clinics, but that of which

the following is an outline has proved in the main satisfactory.

The nurse having previously taken the personal history of the new cases (before the clinic hours, if possible), calls a new case into the first room for the primary examination. It is best that this examination be made by the physician in charge. This may seem to impose an irksome routine on the attending physician, but in skilled hands the examination of the majority of cases is quickly made, and in no other way can he keep in touch with all the cases, and regulate the treatment. The result of the examination is dictated to the nurse who records it on the patient's record card, together with suggestions for operation or treatment. The case is then assigned by the attending physician to one of his assistants, the name of the assistant being stamped on the record card and also on the patient's identification card. On returning to the clinic the patient is called into the second room by the assistant to whom he was assigned, and the recommendations for treatment previously noted on his card by the attending physician are carried out. If for any reason the attending physician wishes to see the patient a second time, he need not assign him to an assistant at his first visit, in which case the patient returns to the attending physician at each subsequent visit, together with the new cases, until assigned. If an assistant wishes further advice about a patient he may at any time bring him in to the attending physician for consultation, and should always return the case for re-examination before final discharge. To regulate the use of the operating room, operations done under a general anesthetic should be done by appointment, and cards given to the patient showing the time, etc.

The above outline may at first sight seem to indicate a rather cumbersome and inflexible system. A little study, however, will show the opposite to be true. In the absence of the attending physician the first assistant assumes his duties, examining and assigning the new cases. A case of uncertain diagnosis he may leave unassigned, and it is seen by the attending physician at his next visit. Or the physician in charge may at any time turn over his work to an assistant, and be free to operate or otherwise employ his time, knowing that the routine will go on uninterruptedly, and that

interesting or difficult cases will return to him at a subsequent visit. This system also allows one assistant to follow a case through its whole course of treatment, as is necessary both for the interest and instruction of the physician and the benefit of the patient.

With the facilities and system described all the operations and treatment necessary in laryngology, with the exception of radical operations on the sinuses, may be carried out. There will be a "hundred and one" details and problems which must be worked out by the individual clinic. Some must provide for students, undergraduate or postgraduate. There are record cards, appointment cards, blanks, etc., the printing of which should be carefully considered. And practically all institutions are hampered in doing all that they wish to do, as well as they would like, by lack of funds. None of us will attain perfection, but this paper is a plea that more thought and care should be given to the management of the clinical work of our specialty—at least the thought and care which the general surgeon gives to his hospital wards and operating room.

15 Central Park West.

XII.

THE YANKAUER OPERATION IN THE TREATMENT OF CHRONIC MIDDLE EAR SUPPURATIONS.*

By Harold Hays, A. M., M. D.,

New York City.

At the May, 1910, meeting of the otological section, Dr. Sidney Yankauer presented a series of cases illustrating the effect of the closure of the Eustachian tube at the isthmus, where suppuration had existed for a considerable length of time. In presenting the histories of these cases, Dr. Yankauer informed us that these suppurations had been due to a variety of causes, such as granulations, polypi, bone necrosis and cholesteatomatous degeneration. In other words, these patients belonged to that class where treatment had been of no avail over a period of months or years and where, as a last resort, the radical mastoid operation is proposed. In those cases shown, I am sure we all are agreed, the results were remarkable. The ears showed little of the drum membrane, the cavities were dry, the mucosa presenting a glazed appearance. There was absolutely no sign of suppuration.

At the time of the demonstration and subsequently in a most masterly paper appearing in the July *Laryngoscope*, Dr. Yankauer described the original instruments used for closing the tube. The paper described twenty-one cases in detail, of which thirteen were absolutely cured and eight partially cured; in other words, these eight cases were considerably improved and possibly in time would be cured absolutely. Parenthetically, I might mention that Dr. Yankauer's paper opens up an entirely new field in otologic work and is a masterpiece of logical thought.

I immediately became interested in Dr. Yankauer's work and learned from him personally how to do the operation,

*Read before the Section on Otology, New York Academy of Medicine, January 13, 1911.

and during the past few months I have operated upon five cases in whom an ear discharge had lasted over a considerable number of years. All available dispensary treatment had been given these patients, with no improvement. Although the discharge has not ceased entirely in any of these cases, yet the improvement is so remarkable that there is little room for doubt that the closure of the Eustachian tube at the isthmus was largely responsible for any change to the better.

I shall take a moment of your time to describe Dr. Yankauer's instruments and procedure.

The instruments which are used for the closure of the Eustachian tube at the isthmus are the salpingeal curettes. The curettes have a hemispherical head with the flat side toward the shank. The cutting edge is circular, having a sixty-

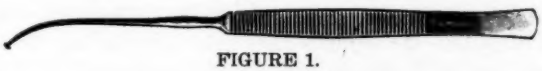

FIGURE 1.

FIGURE 2.

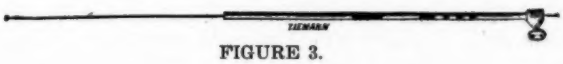

FIGURE 3.

degree cutting angle (Fig. 1). The projection of the cutting edge has been adjusted to correspond to the thickness of the mucous membrane. There are three different sizes—the smallest, with a projection of a quarter of a millimeter; the largest, a half millimeter. Each cutting edge has been mounted on a shank which is shaped to correspond to a curve made by the external and middle ear and Eustachian tube. A probe (Fig. 2) accompanies the curettes for purposes of exploration before cutting.

The technic of the operation is as follows: The Eustachian tube is first anesthetized from its pharyngeal end by means of applications saturated with strong cocain and adrenalin. Dr. Yankauer's applicators (Fig. 3) are ideal for this purpose. They fit into a metal tube on which are markings to indicate how far one is in the tube. Other applications of cocain

are made to the tube via the middle ear and then the tube and ear are thoroughly cleansed by irrigating with boric acid. This is best done by syringing through the Eustachian catheter. The parts having become insensitive, the tube is explored down to the isthmus with the salpingeal probe and, the caliber of the tube having been approximately ascertained, the proper sized curette is selected. The cutting of the mucosa must be done entirely by the sense of touch. The cutting edge is rotated to and fro until one feels that he is down to bone. The mucosa on the superior wall is the most difficult to cut. At the same time the cutting edge is scraped backward and forward until one has denuded a sufficiently wide area. Dr. Yankauer personally suggested to me that more extensive curetting should be done at the anteroinferior angle than anywhere else, in fact almost as far as the middle ear. As the curette is withdrawn, some strands of mucosa may be seen extending into the middle ear; after the operation is completed, the ear is dusted with iodoform powder. An inflammatory reaction takes place in the tube and middle ear, which subsides in the course of a few days. As a rule the patients are told to take the same care of their ears after as before the operation. No untoward results have yet been observed. The objection that one might readily curette into the internal carotid artery through a dehiscence in the bone is easily overruled; for if one has the least sense of touch and does this operation delicately (as it should be done), he always knows by the feel of the curette whether he is down on bone or not.

I shall summarize four of these cases:

CASE I.—A young woman of 25 years had had a profuse discharge from the left ear since childhood, which had resisted all treatment. Examination of the ear revealed the presence of foul-smelling pus, a small amount of granulation tissue over the short process of the malleus, and necrosis of this bone. The granulations and malleus were removed and a week later the Eustachian tube was closed. For a few days there was a discharge of a thin mucoid material which ceased at the end of two weeks, the ear subsequently remaining dry for two months.

CASE II.—A young woman of 22 years had had a profuse foul-smelling discharge since childhood. Treatment of no avail. The tube was very large. After curetting the isth-

mus, a pinkish swelling of the internal wall of the middle ear took place, with a discharge of a thin watery secretion, which cleared up—the ear remaining dry for about six months.

CASE III.—A young boy, 14 years of age, came to the New York Eye and Ear Infirmary complaining of continuous suppuration from the ear since childhood. Examination showed numerous aural polypi, with a profuse discharge of foul-smelling pus. The polypi were first removed with the aural snare and Hartman forceps and the bases cauterized with the silver stick. Suppuration still continuing, the Eustachian tube was curetted. For a few weeks the discharge was still profuse, but of a more mucoid appearance, and since that time it has become less and less until it has almost entirely ceased.

I was so much pleased with the results in the first three cases that I intended to present them to you at the December meeting. Much to my dismay, with the onset of the cold weather, all four cases began to suppurate again, the discharge not being so great as before the operation, but still bad enough to preclude any conclusion from being reached.

In justice to Dr. Yankauer, and in order to have us all form an unbiased opinion, I determined that it was best to let him see the cases personally and suggest some fault in my technic. So the first Sunday in December I sent the cases to his office, where we went over them thoroughly. Much to my surprise, the Eustachian tubes were closed absolutely in three of the cases (1, 3 and 4), and in the fourth bubbles of air could be forced through water in the canal, but no probe or applicator could be forced through the tube. In case I. an adhesion was found near the oval window which, on being cut through, improved the patient's hearing immediately, and the discharge is much less since that time. In case II. a number of fistulous tracts were found, behind which pockets of pus had formed, keeping up the discharge. These were opened and the tubes again curetted, since which time the discharge is very slight. In this case Dr. Yankauer found a dry hard drum membrane flat up against the inner tympanic wall, which he partially incised. Case III., the boy with the polypi, was doing so well that we decided to let him alone and watch him carefully. Although the tube seemed to be closed in case IV., it was decided to curette it again,

as nothing could be found in the middle ear to account for the discharge. Since that time the ear condition is considerably better.

After this seance, I came to the conclusion that closure of the Eustachian tube at the isthmus, in itself, was not sufficient to cause a cessation of a chronic discharge in many cases; moreover, that it is absolutely necessary in a great many cases to perform some intratympanic surgery or treatment which might materially lessen the discharge or cause it to cease entirely. Polyps must be removed, sequestra must come away, fistulous tracts and pockets must be opened, adhesions broken down. If after such surgery is performed the discharge still continues, particularly if it be of a mucoid appearance, the tube should be closed. In such cases a good result should be expected.

In Dr. Yankauer's presentation, I was led to the conclusion that, given a case of chronic middle ear suppuration, all that was necessary was to close off the tube at the isthmus. This opinion was corroborated by the statement in his paper that "most of the patients had some favorite method of treating their ears * * * and they were allowed to continue the same form of treatment, more as a placebo than for any other reason. We may therefore state with logical accuracy that the results obtained were directly caused by closing the tube at the isthmus and by this alone." However, a close perusal of the description of his cases leads me to other conclusions, for it will be seen that in every case save those where nothing of pathologic significance was found in the tympanic cavity, some intratympanic manipulation was necessary. For example, he says in case II.: "Examination showed the presence of a large aural polypus filling the entire canal and obstructing the view of the middle ear. After shrinking the polyp with cocain and adrenalin, part of it was removed, sufficient to give access to the tubal region. The tube was then curetted. After the operation the discharge became mucopurulent, but was so abundant that another portion of the polyp had to be removed to obtain drainage. The patient was using instillations of alcohol which had previously been prescribed for him, and he was allowed to continue them, but applications of nitrate of silver were made to the polyp twice a week. The discharge from the ear became very slight and

the polyp became gradually smaller. * * * Four months after closing the tube, examination showed that the ear had become quite dry and clean, the polyp having entirely disappeared." In another case the polyp was removed with the ossicles and the inner attic wall.

The questions which present themselves most manifestly to all of us are these:

1. Has the Yankauer operation any value if done with no other intratympanic manipulation?
2. In what class of cases is it distinctly of value?
3. Would a certain number of chronic suppurating ears cease discharging if properly taken care of medically and surgically, without submitting the patient to a closure of the tube.
4. Will the Yankauer operation, together with other intratympanic procedures, supersede the severe radical mastoid operation in many cases?

1. I think that certain cases which Dr. Yankauer has shown, and others operated upon by other men, will lead us to definitely state that this operation *per se* will clear up a great many cases which have persistently suppurated for years. Dr. Yankauer claims that there are certain cases which constantly become reinfected through the Eustachian tube. We are literally blowing our noses through our ears whenever a perforation in the drum is present. "The mere presence of a perforation greatly facilitates the communication between the middle ear and the nasopharynx, and all the changing bacterial flora of this infected region are constantly being added to the already existing sepsis in the drum cavity." In such cases, closure of the tube at the isthmus should bring about an absolute cessation of discharge. In other words, in that class of cases where the discharge is more mucoid than purulent, where no lesions can be found in the middle ear than granulation tissue caused by the discharge, we should expect a complete cure by the Yankauer operation.

2. In what class of cases is the operation of distinct value? Beside the class enumerated above, there are certain cases in which all polypi, dead bone, etc., have been removed and yet the discharge has persisted. To this class belong most of the cases cited by Dr. Yankauer. It has become an axiom of surgical practice that, given a pathologic perversion of tis-

sue, no cure may be expected without the removal of this tissue. I do not think it would have been possible for Dr. Yankauer, or any one else, to have effected a cure in any of the cases he mentions by merely closing off the tube and nothing more. Although a great deal of the ear trouble may have been caused by the constant reinfection from the nasopharynx, once the pathologic condition is present, nothing but eradication of the diseased parts will help to effect a cure. However, we have had the experience of not being able to stop an aural discharge entirely, even by the most painstaking care, and it is under such circumstances that the Yankauer operation fills a long-felt want.

3. Would a certain number of chronic suppurating ears cease discharging if properly treated medically and surgically, without submitting the patient to a closure of the tube? I believe this a mooted question. A great many of the men to whom I have spoken on the subject have claimed that they could cure 80 per cent of these cases by simple means—such as removal of dead products and cleanliness. Granted that they have the ability to do so, what shall be done with the other 20 per cent, which they cannot cure, except possibly by a radical operation? I am inclined to the belief that 40 of the 80 per cent could not or would not submit to treatment extending over months at a time. Patients who come to the clinic certainly would not benefit by such a delay. Economically, it is of a great deal of importance for such patients to get well as quickly as possible, and if the Yankauer operation will help them to get well in weeks instead of months, it is certainly a valuable procedure. Again, this other 20 per cent have no alternative but to submit to the radical operation.

4. Will the Yankauer operation, with other intratympanic procedures, take the place of the severe radical mastoid operation in certain cases? It is in this class of cases, I believe, that the chief value of the operation lies. There are any number of radical operations in which no necrosis is found in the mastoid cavity, in which the pathologic processes are distinctly confined to the middle ear cavity and attic. It is rational to suppose that cleaning the ear of all diseased bone, granulations, etc., by itself would effect a cure. But it has been within the experience of us all that such is not the case.

Moreover, the fact is so well recognized that the Eustachian tube plays an important part in these cases that a radical operation is not considered complete unless the Eustachian tube is curetted and closed off. In such cases, as Dr. Yankauer so aptly says, we should place the horse before the cart. One should clean out the middle ear cavity as well as possible, and also close off the Eustachian tube. If the discharge does not cease, see what has been overlooked, and if the tube is not closed, operate again. If after a reasonable length of time suppuration continues, it is still time to do a radical operation. Moreover, there are some few patients with suppurating ears who object to the radical operation. These patients are surely deserving of some attention, and, up to the present time, the operation proposed by Dr. Yankauer, taken in conjunction with other remedial measures, offers the best hope of relief.

I have offered these few facts in the form of an argumentative essay, in order to provoke a free discussion of the subject. None of us is in a position at present, considering the newness of the subject, to condemn the operation. It should receive the fair trial it justly deserves, and I believe that in time it will become one of our most important surgical procedures. I believe that every one of my cases has been improved by the operation, and that in the course of the next few months they will cease suppurating entirely. The only other alternative I could offer these patients would be a radical operation, and I could not be sure that the final results would not be as bad, or worse, than the disease itself.

11 West 91st Street.

XIII.

THE PATHOGENESIS OF OTOSCLEROSIS: TREATMENT.*

By Professor Gherardo Ferreri,

Rome.

(Translated by W. Sohier Bryant, A. M., M. D., New York City.)

Otosclerosis, as a term, has been subjected to numerous restrictions ever since Tröltsch first united various pathologic entities under this denomination. At present it is confined to a definite group of aural lesions. These are characterized clinically by "progressive deafness," and recognized objectively by acoumetric constants, permeability of the eustachian tube, and a normal appearance of the drum membrane. The anatomic changes are: ankylosis of the oval window and stapes; osteitis, with spongy degeneration of the labyrinthine capsule.

In literature reference is made to otosclerosis as early as the eighteenth century, when Valsalva mentions among the causes of deafness, ossification of the annular ligament and ankylosis of the stapes in the niche of the oval window:

"Membranam per quam basis stapedis fenestrae ovali annectitur, illam non omnino immobiliter annectere probatum per observationem. In hanc Fenestram Basis Stapedis intruditur, quam exacte claudit, eique tennuis membranae interventu circumquaque adhaeret; non ita tamen stricte, quin sursum, deorsumve, ut opus est, per eamdem Fenestram noveri possit. Olim namque cujusdam surdi cadavere surditatis causam in eo sitam inveni, nempe quod indicata Membrana in substantiam osseam indurata, unum continuatum os constituebat

*Read at the Thirteenth Congress of the Italian Society of Laryngology, Rhinology and Otology, Rome, April 10. Archives de Laryngol., XXX, No. 1, 1910.

cum Basi Stapedis et margine Fenestrae Ovalis; ideoque efficiebat, ne amplius sursum deorsumve eadam Basi moveri posset." (Valsalva, Tractact. de Aure humana, cap. II, par. 10.)

In 1835, Toynbee called attention to the progressive rigidity of the stapedio-vestibular joint as a cause of deafness in otosclerosis. Finally, the question has been considered by the greatest specialists from a pathologic standpoint. Those wishing to familiarize themselves with the subject need but consult Denker's exhaustive monograph, which includes the greater part of the bibliography pertaining to otosclerosis and cites all the observations by which ankylosis of the stapes has been proven at autopsy.

Recent etiologic explanations have weakened the term otosclerosis, which does not coincide etymologically with the vascular spongefying process that, according to Politzer, Denker and Habermann, attacks only the labyrinthine capsule. If we must continue to assign an inappropriate term to this rarefying osteitis of the labyrinthine capsule, why not follow Sohier Bryant and call all chronic inflammatory, sclerosing processes of the mucous membrane covering the tympanic walls "chronic interstitial otitis"?

Some authorities combine otitis media hyperplastica or interstitialis with osteospongefying capsular labyrinthitis, claiming both to be stages of the same morbid process called otosclerosis. Sohier Bryant's theory opposes the pathology of otitis media hyperplastica rather than that of osteitis spongiosa. He claims, substantially, that the disease may begin with either an anemic or hyperemic condition of the entire drum cavity or of certain areas only, and that anemia or hyperemia may be primary or secondary. Cases of primary anemia are usually those of chlorotic women. When the condition begins with anemia there is atrophy of the mucous membrane followed by degeneration, calcification and fibrous atrophy. The tympanic membrane undergoes similar changes. When the condition begins with congestion—according to Sohier Bryant—we observe in succession: vascular proliferation, interstitial hyperplasia followed by contraction and compression of the vessels, anemia, degeneration and calcification. When the process affects the periosteum and bone, hyperostosis or osteoporosis may result. Sohier Bryant also believes that, from a patho-

logic point of view, otosclerosis is always the result of a nutritive vascular disturbance of the mucous membrane and periosteum covering the tympanic cavity. Because of the limited arterial supply available for the nutrition of the mucous membrane of the ear, circulatory disturbances of that organ are easily induced. And, also, because of the relation existing between its innervation and the tympanocarotidian plexus, the ear exhibits many variations of the blood supply in a restricted area.

This is certainly a very ingenious theory and explains that form of chronic otitis media which our school has baptized "otitis media interstitialis" or "hyperplastica." But postmortem examinations made upon those long afflicted with progressive deafness show that not all cases of otosclerosis present changes of the middle ear, but that each has a lesion of the labyrinthine capsule. These facts prove that the theory fails to corroborate the etiology of otosclerosis as described by Politzer and Habermann.

For twenty years classical manuals mentioned but one form of dry catarrh or hyperplastic otitis media accompanied by progressive deafness, thus confounding otosclerosis with a number of nonsuppurative cases of otitis media. Lucae, as well as Sohier Bryant, upholds tenaciously the theory that in the majority of cases, hypertrophic or suppurative inflammation of the tympanic cavity is the cause of otosclerosis. He believes that in otosclerosis there is a tendency to disregard a transitory suppuration which has occurred during infancy or adolescence. Long ago chronic, nonsuppurative inflammations were supposed to result from severe chilling, and it was believed that these, instead of resolving, engendered sclerosis of the mucous membrane of the tympanum and produced rigidity of the ossicular chain involving the tympanic membrane, the ligaments of the stapes and the membrane of the round window. In conclusion, Lucae is disposed to admit that in certain cases there is a primary lesion of the labyrinthine capsule. He believes that a scrupulous otoscopic examination, with the employment of perfected diagnostic methods, would notably reduce the number of cases of true otosclerosis and that the majority of cases would be grouped under simple, hyperplastic middle ear disease of tympanic origin. In fact, until recently, all chronic middle ear inflammations characterized

by paracusis, progressive deafness and vertigo were classified under the obscure term "dry middle ear catarrh." One feels, therefore, the necessity of subdividing this group and making a classification of the various morbid entities on the basis of (1) pathophysiologic researches conducted on the ears of the deaf; (2) improved and more accurate otoscopic and functional tests, and (3) researches in etiology.

In the first place we distinguish a group of chronic middle ear inflammations which, though not caused by acute inflammation, present phases of old dry catarrh and are caused by stenosis of the tube. This condition induces hyperemia and inflammation of the mucous membrane in the tympanic cavity, together with hyperplasia, hypertrophy and synechia. These changes proceeding from hyperemia through hyperplasia and which may end in atrophy, constitute a separate class of tympanic affections, having nothing in common with the inflammatory processes. We are astonished at the ostracism imposed on the term "middle ear catarrh," which characterizes this class of chronic affections of the tympanic cavity.

The symptomatology of middle ear catarrh is very analogous to that of otosclerosis. There is, however, an essential difference in the results of treatment. Up to the present time treatment has frequently been successful in cases of the first class—middle ear catarrh—while it has remained absolutely negative in those of the second class—otosclerosis. In the first group we find the middle ear catarrhs of the gouty, the diabetic, the albuminuric; those coming from circulatory troubles in Bright's disease, the cardiacs, cirrhosis of the liver and arteriosclerosis; those observed in leukemia and the sanguine discrasias; those of Basedow's disease, or those caused by disturbances of the great sympathetic. (Angioneurosis.)

The progressive deafness appearing in the course of pregnancy and lactation is, in part, due to middle ear catarrh. Still, the majority are cases of true otosclerosis whose morbid entity has been recognized from a patho-anatomic point of view, independent of the labyrinthine capsule in which it originates.

Politizer says that classical otosclerosis is a primary affection of the labyrinthine capsule, which localizes principally near the oval window. He maintains that the new-formed bone substance does not originate in the periosteum, but in the

labyrinthine capsule. His theory is based on the following data:

(1) A great number of sections from the promontorial wall showed that the recent osseous process did not pass from the periosteum to the deeper bone; but that the osseous disease extended uniformly through parts of the labyrinthine walls.

(2) Circumscribed islands of new-formed bone were sometimes found in the deeper regions of the normal bone, with normal bone between them and the periosteum.

(3) In typical cases of otosclerosis the mucous membrane of the tympanum and periosteum showed not one lesion.

On the other hand, after examining the temporals of two otosclerotic subjects, Habermann states that the new osseous formation originated in the periosteum and only later invaded the labyrinthine capsule. He believes that in such cases otosclerosis has little foci—circumscribed centers—having for their point of departure the borders of the round and oval windows at that point where the periosteal vessels enter the bone. The osteitis ultimately affects nearly the entire capsule, but never the membranous labyrinth.

Histologic examination showed that the capsule presented characteristics of the vascular osteitis of Volkmann, with numerous dilated capillary vessels and osseous rarefaction, especially in recently involved portions of the labyrinthine capsule. The parts longest affected were the seat of new-formed dense bone. Katz, also, after examining numerous histologic preparations from an otosclerotic cat, concluded that the malady has its origin in the periosteum of the drum cavity.

From microscopic examinations of the labyrinthine capsule of an otosclerotic patient, Jörger Möller recognized normal tissue as very distinct from foci. In the latter, the recently formed osseous lamellae, instead of being straight, showed irregular curves surrounding the numerous vessels which were much larger than the Haversian canals of healthy bones. The new-formed vessels made an extended plexus in these medullary canals. Along the walls of this cavity abundant osteoblasts were found, as well as many osteoclasts in its central parts. Where the osteitis seemed oldest the osseous lamellae were thin and the medullary canals were surrounded by a fibrous coat containing few cells and sparse vessels. In view of this exami-

nation, Jörger Möller admits with Politzer that otosclerosis consists of a new formation of osseous tissue whose tendency is to replace the normal tissue, which, in the later stages, is largely absorbed, forming osteoporosis. On one point I agree with Moos, Bezold, Scheibe, Politizer, Edm. Hartmann and Siebenmann, who have studied the subject thoroughly. I refer to the exclusion of the hypothesis that otosclerosis is secondary to changes of the tympanum. It is a primary lesion of the stapes, the oval window and labyrinthine capsule.

Katz and Habermann besides the labyrinthine capsule include the head of the hammer and the body of the incus among the bones attacked by otosclerosis; but I found no lesion in numerous histologic sections of ossicles taken from otosclerotic subjects. I found the bones rachitic and osteomalacic.

For example, in comparing two preparations—one of the hammer and incus of a normal subject, the other of the same bones taken from an osteomalacic woman—from a histo-anatomic point of view, we find no differences. This supports the fundamental idea of Politzer that the lesion primarily attacks the capsule and not the middle ear. If, on the other hand, it were found that the hammer and incus participated directly in the morbid process, we should be obliged to admit that sometimes otosclerosis is a secondary manifestation.

To sum up, if the lesion is recent, the microscopic examination of the bone areas affected by otosclerosis would show the presence of osteoid tissue; if old, spongy tissue would be found. In the new-formed osteoid tissue we would find a great number of medullary spaces filled with cells, of which some would be giant cells containing many nuclei. Generally there are, in various localities, bony canals for the blood vessels which are full of blood corpuscles, while in others the vessels are free of corpuscles.

To differentiate between hypertrophic or interstitial middle ear inflammation and otosclerosis one must observe certain diagnostic points besides the otoscopic examination (which in the latter case will show the integrity of the tympanum, except for a slight congestion of the mucous membrane of the promontory). These points are well explained by Shambaugh, who considers them characteristic of the disease. In otitis hyperplastica interstitialis the functional disturbances are always limited to the transmitting apparatus; whereas, in laby-

rinthine capsulitis other changes were added. These—a weakening of sound perception and faulty equilibration—are caused by osteitis spongiosa of the corresponding portions of the capsule. Cases of otosclerosis are constantly seen in which there is no obstacle to sound transmission, while there are definite acoustic disturbances as well as disturbances of equilibrium.

Shambaugh distinguishes three distinct classes of otosclerosis. In the first group the auditory disturbance is due solely to the rigidity of the stapes. Consequently diagnosis is simple, even at the beginning of the disease. The bone conduction is prolonged, Rinne test is negative and the low limit of tone perception is raised.

The second group includes those cases in which ankylosis of the stapes plate is accompanied by auditory disturbances, more or less marked in proportion as the labyrinthine capsule is involved. The osteitis spongiosa does not always originate in the immediate vicinity of the oval window. Disturbances of equilibrium are found where the bone changes near the vestibule are aggravated. On the other hand, if the cochlea is more directly affected there are functional disturbances of that part of the organ of Corti which is to some extent connected with the diseased part of the capsule.

Shambaugh explains how, in certain typical cases of otosclerosis, there can be a gap in the perception of the high notes of Galton's whistle, when neither fixation of the stapes nor disturbance of the conducting mechanism is present, because a portion of the labyrinthine capsule, in the neighborhood of the oval window, is attacked primarily, and consequently disturbs that part of the organ of Corti which is beneath the promontory.

Bezold described cases in which, besides the ordinary indications of otosclerosis, the auditory gaps are limited to the middle notes of Galton's whistle. This condition is never found in hypertrophic or interstitial otitis.

The third group are those cases in which the footplate of the stapes remains movable (a condition which is never seen in hypertrophic middle ear inflammations), and in which it is probable that the osseous spongefying process affects the basilar whorl of the cochlea. Without the findings of a post-mortem examination, such cases are very embarrassing, as

they may be mistaken for those of nerve deafness. One must, therefore, note not only the marked rise in low tone perception, but also the defect in perception of the higher tones of Galton's whistle.

After reviewing the recent opinions of the best known writers on the nature of the morbid process which marks otosclerosis, and after having established a definite distinction between otosclerosis and middle ear interstitial inflammations —whether hyperplastic or dry—we approach the etiology of the disease which has caused so much discussion.

Until now, authors have expressed the most diverse opinions concerning its causes, assigning as such: rheumatism, gout, neuroparalytic heredity, ozena and syphilis. Gradenigo, Siebenmann and Habermann have said that it is a parasyphilitic affection, and they prescribe antisyphilitic treatment for all cases of otosclerosis. This hypothesis of the spongefication of the labyrinthine capsule seems somewhat doubtful. Even when the Wassermann reaction is positive, we must suppose that the contagion has merely contributed to a latent, incipient affection. It has been shown that hereditary syphilis in its termination almost always attacks the auditory nerve, together with the middle ear and labyrinthine capsule. The hypothesis that otosclerosis is an autotoxic hematogenous disease has gained ground.

It is said that in certain countries, England and Southern Italy for example, where a gouty heredity predominates, cases of primary otosclerosis are often seen. Gout must not be excluded from the etiologic causes of the malady, particularly as the gouty lesions which attack the articulations, auditory canal and auricle may show themselves in the form of otosclerosis followed by rarefaction in the niche of the oval window, causing obstruction to the movements of the stapes. Many cases of otosclerosis seen in gouty subjects cannot be imputed directly to the latter condition, but must be attributed to a state of autointoxication of the organism, whose presence is exhibited by lithemia and cholemia. Why not include osteomalacia and rachitis among the probable causes of otosclerosis? Both of these, according to recent researches, are of infectious origin.

From every point of view we can admit that autointoxications are frequently latent or hereditary. This hypothesis ex-

plains the appearance of otosclerosis among certain patients at special periods of their lives, when the general nutrition is undergoing profound changes. For instance, among the rachitic when the skeleton is developing, and among osteomalacic women during pregnancy and prolonged lactation. Considered etiologically, the only causative factor positively recognized is the predilection of otosclerosis for the female sex. This view precludes the influence of rhinitis—often cited as an etiologic factor in ankylosis of the stapes, when actually it acts only as an aggravation of a morbid process already present.

In many cases of congenital deaf-mutism, loss of hearing is due to an early attack of capsular labyrinthitis developed during the fetal period coincident with maternal autointoxication, or infection of some other nature, such as that of rachitis or osteomalacia. The latter diseases have recently been shown to be of diploccocic origin.

Politzer was the first to suggest a relationship between otosclerosis and the puerperium, but we think he was mistaken in considering otosclerosis a true infectious puerperal osteitis. Hanau is more exact in saying: "We must not be surprised if the frequent lesions of the skeleton during the puerperal period attack the cranial bones, including the temporal." In order to explain the relative frequency of otosclerosis at this period, Habermann insists that conception and the commencement of the syphilitic infection are simultaneous, and concludes that in most cases syphilis is the cause of otosclerosis. T. J. Harris explains the part played by pregnancy as a predisposing factor by the relation existing between the sexual and the sensory systems. This theory, however, seems far-fetched. It would be better to take into account two more important factors, very intimately related; rachitic heredity and osteomalacia.

Lucae in 37 per cent and Bezold in 52 per cent of their cases demonstrated the influence of heredity in the etiology of otosclerosis. These figures are very significant to those who attribute the disease to osteomalacia and rachitis (which are hereditary diseases), rather than to syphilis. Siebenmann corroborates this origin of otosclerosis and attributes hereditary otosclerosis to an anomaly in the development of the embryonic ear. As a matter of fact, rachitic lesions are some-

times recognizable in the newborn; it is possible that these lesions may have already affected the labyrinthine capsule. In a short article which was favorably received, we tried to demonstrate that repeated pregnancy exerts a prejudicial influence in the case of aural sclerosis and syphilitic labyrinthitis, whether inherited or acquired.

Milligan also maintains that pregnancy may aggravate progressive deafness caused by hyperplastic otitis media and capsular labyrinthitis. Referring to the capsulitis, which is nearly always bilateral and most often attacks young pregnant women, he gives vague observations, alluding only to an infected condition of the organism. He says that since elimination is not regular, the blood always contains toxins, which condition brings about dystrophic processes of the osseous labyrinth, the membranous labyrinth and the nerve terminations. All this is very superficial. In the same way we can dispute Birkett, who believes that the aggravated deafness of pregnant women is found among those only who show lesions of the labyrinthine capsule.

The writer claims the priority of his opinion expressed in an article on "The Influence of Pregnancy on Acute and Chronic Changes of the Ear" (*Arch. Ital. di Otol.*, vol. XIX, Fasc. 3, 1908): "As to the nonsuppurative changes of the middle and internal ear (which may first show themselves or be aggravated during pregnancy), contrary to many aurists, we are persuaded that, from an etiologic point of view, these should not be confounded with changes of the same kind sometimes appearing during lactation. These nonsuppurative changes are usually the effect of hematoxic retention in the auditory organ of pregnant women, and the probability is good that they will lessen and disappear after confinement. Other changes have a much more uncertain prognosis, being of neurotrophic origin and in reality related to anemia of the nerve centers."

The recent etiologic conceptions of osteomalacia and rachitis have called our attention to otosclerosis during pregnancy, and have led us to suspect that osteomalacia may be the origin of the evil, just as early otosclerosis in the young may be of rachitic origin. The infectious theory of these two diseases tends to confirm their close relationship, which, according to Arcangeli, should be proven by epidemic and clinical obser-

vations and anatomico-pathologic researches. Apropos of the close affinity of these two diseases of the osseous system, the writer has noted that they often follow an endemic course in the same country, and that they are increased by special conditions. It is frequently found that rachitis is common among the children of osteomalacics who have had the former disease in infancy. Rachitis often precedes maternal osteomalacia, yet the reverse is equally true. Among the extreme cases of classic rachitis and osteomalacia of pregnancy there are ill-defined forms which show similar fundamental characteristics.

Morpurgo infers, on the basis of histologic examinations of the osseous tissue, that osteomalacia and rachitis are more or less exaggerated manifestations of a single process. Artom excised pieces of rib from osteomalacic women and rachitic children and found that almost identical micrococci developed in various media from cultures of these bones. Schmorl has produced rachitis in white mice by injecting into them the medullary substance of osteomalacic mice. Morpurgo has inoculated white rats with osteomolacic material. Each case resulted in the development of osteomalacia or rachitis, according to the age of the animals. Artom inoculated adult white rats with diplococcus taken from rachitic children without exciting an inflammatory action at the point of injection or a general reaction (diplococcus not being pyogenic), but he observed at the end of two or three months that the animals were affected by motor disturbances. Radiography showed extensive alterations of the bones—rarefaction and fractures. He proved by microscopic examination that these lesions were analogous to those obtained by inoculating mice with osteomalacic material.

No one can deny the importance acquired by the theory of the infection of osteomalacia in revolutionizing our ideas on the etiology of otosclerosis. The evidence, from a clinical point of view, makes us suspect that an infectious condition of the organism directly affects the osseous system, and that, in certain subjects, because of hereditary peculiarities, the infection begins, by preference, in the temporal bone and labyrinthine capsule.

Arcangeli's doctrine of the pathogenesis of rachitis and osteomalacia has won over the writer, who hopes that in Italy,

where the two diseases are so common, aurists will become interested in the spread of otosclerosis. Above all, the relationship must be established between otosclerosis and these two diseases, and researches must be made in countries where the former is endemic, so as to recognize the cause of progressive deafness and to establish as to whether a lesion exists in the auditory organ early in the life of the rachitic child. Finally, a study must be made of osteomalacic heredity or the rachitism of the otosclerotic.

Recent studies on the pathogenesis of osteomalacia bearing on the diplococcic infectious origin of the disease, and the confirmation of this theory by the transmission of human osteomalacia to white rats, have drawn our attention to the predilection of otosclerosis for the female sex and especially pregnant women.

Because of the great number of osteomalacics seen at the obstetric clinic of Professor Arcangeli, it occurred to the writer to observe those cases in whom the search for diplococcus had proved positive, and whose isolated diplococci, when injected subcutaneously into white rats, had produced either osteomalacia or rachitis, according to the age of the animals.

The writer soon discovered that even those patients who upon superficial examination had shown no signs of abnormality in audition exhibited very marked auditory disturbances after careful functional tests. Two of them were so severely affected that we brought them to the otologic clinic for treatment. One underwent ossiculectomy of the hammer; the histologic examination found this ossicle normal. In another case a fragment of rib was taken out, and a subcutaneous inoculation was made from it into the backs of white rats. Three months later they presented typical osteomalacia. What is of particular interest to us is that in radiograph of a normal and a malacic rat taken on the same plate and in the same position, the latter animal showed evident rarefaction of all the cranial bones, and especially of the labyrinthine capsule.

In all the osteomalacic patients seen at the obstetric clinic the chief auditory changes were: Marked diminution in hearing; persistent, irksome auricular sounds; occasional headaches and vertigo. Functional tests were conducted with great scientific precision. Tests made with tuning forks, as

well as with the watch, the voice, and Galton's whistle showed that the changes were beyond the middle ear and were localized in the internal apparatus. This opinion is confirmed by the otoscopic examination, which gave no evidence of the pathologic changes commonly attributed to a lesion of the conductive mechanism. Slight tympanic changes were observed in some patients, which in no way accounted for the auditory functional disturbances. The functional results obtained by the Rinne and Galton showed these changes to be of no importance.

Finally, in order to confirm the localization of the disease in the internal ear, allow me to add that the rhinopharyngeal examinations were negative in finding any of the alterations generally considered causative of middle ear disease. Therapeutics also have proved our theory.

Our theory has been proven therapeutically. While at the clinic the patients received osteomalacic treatment, i. e., Wright's vaccine, which as a rule consisted of the diplococcic culture taken from the patient. The result was usually most satisfactory, there being a decided general improvement as well as an improvement in hearing. These researches enabled me to demonstrate that many cases of otosclerosis in women originate from an infectious process analogous to that of osteomalacia. The lesions are best described under the denomination of "osteomalacic capsular labyrinthitis."

We hope that progressive otology will eventually find a means of curing or more or less checking this grave disease of the ear. It must be admitted, however, that up to the present none of the proposed methods of treatment is beyond criticism. Concerning the present treatment of otosclerosis, one can apply to it Alembert's judgment of medicine in general, expressed in a letter to the King of Prussia: "I would have recourse to it as late as possible. I consider it the sister of metaphysics because of its uncertainty."

By good fortune a knowledge of the pathologic anatomy of otosclerosis has contributed to the renown of otic therapy. The fact that this has demonstrated that the affection involves only the labyrinthine capsule and almost never, or only secondarily, the membranous labyrinth, makes us forget the mistakes of the apostles of mobilization and extraction of the stapes through the auditory canal or after the mastoid opera-

tion. Such surgical interventions would be justified if, as earlier authors believed, otosclerosis were concerned with chronic middle ear inflammation, and if the histologic changes of the labyrinthine capsule (according to Habermann) had not shown that osseous lesions are not as extensive on the surface as underneath.

This osteitis is characterized by foci, limited as a rule to two or three, rarely more. In these osteitic lesions the oldest and least severe is found near the periosteum, and those most recent and extensive near the endosteum of the labyrinth. We have learned that the interventionists have made a false move, and that in attempting the amelioration of progressive deafness it would be better to be guided by recent etiologic investigation.

Since it cannot be denied that certain cases of otosclerosis are brought about by heredity or acquired syphilitic infection, it is logical to have recourse to specific medication, especially where the Wassermann test is positive. In cases where the cause of the disease is related to a gouty diathesis it is necessary to use the means put at our disposal by general medicine.

Periods of prolonged intermission have been noted as well as temporary amelioration, which has phases of recrudescence and remission, especially at its beginning. These phases occur before the deformities and the spongy lesions of the bone of the labyrinthine capsule in particular have acquired stability.

Forms of otosclerosis are also seen in cases of grave glycosuria, where the increase of sugar in the urine aggravates the otosclerotic symptoms, and it becomes necessary to follow a stricter régime and resort to inhalation of oxygen and tonic medication. Mineral phosphates or the organic preparations are especially indicated. The writer advises the use of Wright's vaccine in the treatment of otosclerotic women. When young people are afflicted with otosclerosis I have no hesitation in attributing it to hereditary rachitis. In such cases I advise the use of subcutaneously injected vaccine from the bones of rachitic children; for it has been found that morphologically the diplococci of rachitis and otosclerosis are similar. I adopted this course in treating three girls, from fifteen to twenty years of age, who showed evident signs of hereditary otosclerosis and rachitis. They were vaccinated,

no change was made in their habits of life, and no medication other than the subcutaneous injections was used. Following the experience of authorities who claim a far more effectual action for the vaccine when injected in the neighborhood of the morbid process, inoculation was made per tubam. It may be a long time before we can attribute real amelioration to this vaccination cure, but until now no other treatment has given any favorable results; moreover, Wright's vaccination is harmless.

I fully expect my theory of the pathogenesis of otosclerosis to meet with opposition, but I hope to be able to justify my views by further researches and experimental control. If, as I hope, the new endeavors support my theory, I believe they will be of genuine therapeutic value in furnishing a more definite diagnosis and in limiting tympanic surgery, which is now frequently undertaken where the indications do not justify it.

XIV.

SOME REMARKS ON SINUS THROMBOSIS WITH PARTICULAR REFERENCE TO THE DIAGNOSTIC VALUE OF BLOOD CULTURES IN OTITIC DISEASE.*†

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The intimate topographic relation existing between the vascular sinuses of the cranial cavity and the temporal bone brings into prominence suppurative diseases of the middle ear and its accessory osseous chambers. An extension of purulent inflammation to these large venous channels is not infrequent, and as its symptom complex is often atypical, great difficulty is encountered in correctly and promptly appreciating the resultant complication. In addition to the superior and inferior petrosal, cavernous and lateral sinuses, the jugular bulb, the internal jugular vein and its neck tributaries, and the smaller veins of the cranial contents perforating the osseous structures in various directions, all play an essential role in localized infections here, and the phlebitis associated with a suppurative otitis, whether acute or chronic, depends in large part for its symptomatology upon the relationship of these structures one with another.

It is, however, in this study with the lateral sinus, and particularly its sigmoid portion, that we are especially concerned, as it is in this venous channel that infection by far most frequently takes place from the middle ear and mastoid cells. In every case of mastoiditis, lateral sinus thrombosis is always a possible sequela, and on account of its relatively high mortality, with the absolute necessity for a serious operation to

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†I desire to express my thanks to Drs. Libman and Celler of the Mt. Sinai Hospital laboratory for their interested co-operation with me in the above work.

prevent general pyemia, all factors that will in any way aid in its early recognition should receive the most careful attention. As a result of the varied and irregular conformations of the temporal bone, the location of the sigmoid sinus also varies greatly, and I am sure that the development of an infected thrombus at this point bears very closely along anatomic lines, as where the sinus is separated from the mastoid process by a thick, noncellular posterior and inferior wall, there is much less danger of infection than when it is well forward in relation with the posterior wall of the external auditory canal, and the adjacent tympanic areas are intimately connected with it by means of the abundant vascular supply. By no means is the anatomic location of the sigmoid sinus fixed, and while in operating on the mastoid process one expects to find the involved portion of the sinus just posterior to the antrum and about one-half inch posterior to the posterior wall of the external auditory canal, yet this location is far from constant, and, as I have before stated, there is probably no important portion of the temporal bone which is so uncertain in its location.

In the study of the sinus in relation to infective thrombosis and its recognition by the valuable aid of blood cultures, a clear conception of its relation to the antrum, which is undoubtedly the remaining focal point of the purulent collection, especially in chronic suppurative otitis media, is most essential. As has been pointed out before, the distance between the sigmoid sulcus and the antral wall rarely exceeds five millimeters, so that in operating for the exposure of the sinus, unless there is a direct osseous fistula, which, of course, at once locates its position and its relation to the focus of primary infection, this point must always be kept clearly in mind. In the majority of cases, especially when the mastoid cortex is thick, the osseous tissue is apt to be thin in the region of the digastric fossa, while, on the other hand, where the mastoid process is small in size, the lateral sinus will often encroach upon the antrum. Again, when the sinus is large and bulbous, it comes in closer contact with the cortex and the posterior canal wall, so that the opportunities for infection are more enhanced in this type of mastoid when the parts are the seat of a purulent infection.

In a general way, it may be said that the sinus may be placed in either one or two positions relative to the antrum

bearing on the development of infection. In one, its groove may be unusually deep, so that this enlargement of the channel lessens the thickness of the strip of osseous tissue separating it from the antrum, or the groove may be placed far anteriorly so that the sinus is brought immediately internal to the antrum. Rarely it may even be in front of it, so that the antral space will be narrowed from without inwards and the relationship between the two present a most intimate type.

The great problem of sinus thrombosis to the otologist is not so much in etiology or in operative technic, but in the early recognition of infection of the sinus, and with the usual symptoms as they appear this is often a most difficult and many times an almost impossible problem, it being in such cases that a study of the blood cultural characteristics in the so-called atypical type of infection presents its greatest value, as will be seen later, practically enabling one to decide whether or not a sinus thrombosis is present, or whether some infection elsewhere is the basis of the presenting symptomatology. Without minimizing the risk of operation in purulent lateral sinus thrombosis, which is considerably enhanced when the extent of the operative field is increased by added jugular involvement, in every case the danger increases greatly as each day passes with the affection unrecognized, or when the surgeon in the face of variable symptoms that are not characteristic hesitates and delays operation.

Undoubtedly the opening of the sinus as an exploratory measure, in the presence of a mastoiditis without fairly positive indications, is not to be considered good surgery, and warning must be raised against too energetic operation under such circumstances. One should be reasonably sure of sinus involvement before operation for its relief is undertaken, and the sinus should not be opened on suspicion, but operation should be performed in either acute or chronic mastoid disease accompanied by characteristic phlebitic symptoms, such as chills, sweats, wide excursions of temperature and pulse rate, and especially where the infection is of the streptococcus type and where there is a significant differential blood count. Where all or a greater number of these characteristic symptoms are present no doubt exists that the purulent focus in the sinus should be attacked at once, but unfortunately in many cases the symptoms are not in any way characteristic in the early stages of its development.

The clinical study of the temperature variations is extremely important, especially in typical cases, where a high temperature of a septic type with wide variations should always suggest infection of the large venous channels. A temperature of 105 degrees or more, depending upon the amount of septic material that is being disseminated throughout the general circulation, rapidly followed by a sudden and violent drop to normal or subnormal within a few hours, is the characteristic of the typical case. The frequency of these temperature variations depends entirely upon the amount and virulence of the septic material that is escaping from the sinus focus, and while there may be but one rise and fall in twenty-four hours, there may be several such fluctuations during the day. Closely associated with the variations in temperature, yet observed only in a comparatively small percentage of cases, is the occurrence of definite chills severe in type and coming on previous to the rapid rise in temperature. Neither the rise and fall of temperature nor the preceding chill, however, are typical in themselves of a thrombosed sinus, as they occur in practically all grave septic conditions and simply indicate that a certain amount of infectious material is being distributed throughout the general circulation. Even in the majority of typical cases, however, no such marked chills occur, and this symptom might be considered as absent, unless a most careful watch of the patient is kept, when from time to time slight creepy or chilly feelings are present. Sweating may or may not follow these apparently minor chills, but is usually profuse after a severe chill and high rise of temperature.

Especially following the mastoid operation may these chilly sensations be complained of, and they are symptoms deserving consideration, particularly if the case is of the atypical type.

The pulse rate and respiration in cases unaccompanied with other intracranial complications, such as brain abscess, generally keep pace with the rise in temperature, but this is not in any way characteristic and does not aid one in establishing the diagnosis, even in otherwise typical cases. Should nausea or vomiting or both be present, and they are frequently absent, they are, like the other symptoms enumerated, in no way characteristic, but they merely indicate that a septic infection of a severe grade is present. In the later stages of a purulent sinusitis, with the patient markedly septic, both nausea and

vomiting are almost invariably observed and are accompanied by the other general symptoms of a septicemia or pyemia, such as digestive disturbances, loss of appetite, heavily coated and foul tongue, a sallow, dry skin, etc. The eye symptoms afford no indication of the particular lesion present, but the pain over the affected side of the head, which is often most severe and even greater than that in an uncomplicated mastoiditis, is highly suggestive, and especially so when there is severe occipital pain or pain along the course of the internal jugular vein.

Locally one may find more or less edema over the mastoid process in the region of the emissary vein. McKernon calls attention to a most important diagnosic sign when sinus thrombosis is suspected after a mastoid operation has been performed, the healthy appearance of the mastoid wound in the early stages of the disease, excepting over the bone of the inner table forming the sigmoid groove, which is darker in color over the thrombotic area, and granulation tissue has not developed at this point. In cases where the sinus is exposed at the time of the mastoid operation without prior symptoms as a guide, the physical condition of the exposed sinus may be of value in determining its condition, that is, it may be flat, compressible or lusterless, and the dura over it may be grayish or yellowish in color, but, however, the physical examination does not always make clear the pathologic changes that are taking place within the sinus, as its external walls may present some of these signs and yet its intima coat and lumen be perfectly normal.

It has been considered in many cases that a blood count, especially an increase in the polynuclear percentage to over eighty, indicates the presence of a focus of pus, from which the general circulation is being infected. In many typical cases this is essentially correct, and such a count is of value in arriving at a diagnosis. In many cases, however, in the experience of every otologist, the blood count is of little or no value in correctly interpreting the condition present, as the polynuclear percentage may be high and yet no sinus disease exist, or the reverse may be the case. Dench clearly estimates this factor when he says that the differential blood count in sinus thrombasis is unsatisfactory, as he has seen a number of cases with a normal count. In one case of thrombosis of the internal jugular vein with suppuration of the supraclavicular glands

of a most severe type, the polynuclear count never rose above eighty per cent. However, it must be borne in mind that the absence of a high polynuclear count does not necessarily mean that there is no clot in the sinus or jugular vein.

A symptom which I have frequently observed in connection with the early development of sinus disease and one which I have never seen described is the occurrence of a unilateral lateral lymphoid pharyngitis or tonsillitis associated with a unilateral adenitis. This adenitis is usually most pronounced beneath the angle of the jaw and at the site of the junction of the facial vein with the internal jugular. The occurrence of a chill and rapid rise in temperature with slight difficulty in swallowing led to the examination of the throat, and in several instances the objective findings seemed at the moment to form a basis for the diagnosis of a pharyngeal or tonsillar inflammation as the causative factor of the symptomatology.

As is well recognized by otologists, the early diagnosis of sinus thrombosis and atypical cases, at any time during their course, cannot often be made by the symptoms which may or may not be present and which have been here outlined. As a result of this uncertainty and the desire to combat the affection by surgical measures at an early stage, where operation affords the greatest hope of relief and cure of this serious infection, much clinical and laboratory work has been done. As a result of various investigations, especially work done abroad by Leutert, Lenhart, Neurnberg, Kobrak and Hasslauer, an early and accurate diagnostic sign, that of the study of blood cultures, has been worked out along practical lines, and the otologist is now in a position to state definitely, in the vast majority of cases, whether sinus thrombosis is present or not, and thus an opportunity is offered for early operation to remove the purulent focus before the general system becomes the seat of serious pyemic infection.

Leutert states that during the course of a suppurative otitis the appearance of great quantities of streptococci in the blood of the lateral sinus confirms the diagnosis of sinus phlebitis, especially when other febrile diseases are not present. In order to ascertain the presence of a thrombus in the sinus he advocates that blood cultures be taken directly therefrom. The significant preponderance of streptococci in the blood of the sinus, as compared with that

obtained from the peripheral venous system, will determine in doubtful cases whether the high fever which is present in the given case is to be ascribed to the aural condition or to some other disease. If there should be a larger number of streptococci in the blood of the sinus, while a smaller number appear simultaneously in the peripheral veins, and if other febrile disease can be excluded, this condition confirms the diagnosis of sinus thrombosis. A negative culture from the blood of the sinus and also from the peripheral veins does not exclude a sinus thrombosis with certainty, as in such cases he states there may be an isolated thrombus of the jugular bulb, and if a deep puncture is not made, a negative culture may be obtained in spite of the presence of a thrombus. In such cases the temperature is a valuable guide in diagnosing the affection, or one may wait two or three days and then repeat the puncture in a deeper place, but this delay should be only in fairly acute cases, because he states that in cases of longer duration the bacteria may greatly diminish in number from the gradual disintegration of the thrombus, when the clinical symptoms will be those of the predominant metastatic foci in various portions of the body. In case both sinuses are involved a septic thrombus is assumed to be present in the one in which streptococci are found either alone or in preponderating numbers. If the number of colonies is about the same from each side, but that in a peripheral vein markedly less, a bilateral sinus thrombosis is present.

Kobrak in a study of 20 cases of acute otitis media accompanied with a rise of temperature, always obtained negative blood cultures, while in cases of marked severity, positive results were obtained only if the fever was pyemic in character. In 11 positive cultures he found streptococci in the blood 7 times, and in 28 cases with streptococcic infection of the middle ear there was general infection in 7, while in 17 cases with local pneumococcic infection this organism was found in the general circulation in but a single instance.

Neurnberg in his original work examined the sinus blood in five cases of thrombosis and found streptococci in each, and by this means he was able to differentiate otitic sinus thrombosis from other febrile affections at an early stage before local manifestations developed. In one patient with a high temperature coming on one week after a mastoid operation and

evacuation of a brain abscess, six days after childbirth, the question arose as to the cause of the fever, as it might have been due to incipient mastitis, puerperal fever, meningitis or sinus thrombosis, but absence of other symptoms seemed to exclude the first three as being present. On account of the negative bacteriologic findings in the blood of the sinus, operation was postponed, but as the symptoms increased in severity the negative blood cultures were disregarded and preparations were made to open the sinus, when an erysipelatous inflammation developed, thus clearing up the diagnosis. As a result of his experience, therefore, he states that negative cultures from the sinus blood should exclude sinus thrombosis, or at least they should justify postponing operation, and that the puncture to obtain the blood must be made deep and close to the bulb of the jugular vein and during a period of temperature rise, otherwise the danger of obtaining a negative result, even should a thrombus be present, is very great, and especially so in case there is an isolated thrombus of the bulb of the internal jugular vein.

From a careful study of the work of these otologists it becomes very evident that a positive blood culture, in the presence of a purulent otitis media, where infection from other sources can be excluded, is indicative of involvement of the lateral sinus by a septic infection, and in a study of over 100 cases of mastoiditis which we have made, a negative result from blood cultures was always obtained in uncomplicated cases, while in 50 cases of involvement of the lateral sinus there were 42 positive results from blood cultures prior to operation. In four the first culture was negative, but the second culture was positive. As I have stated, on a previous occasion, the otologist should not necessarily depend on the laboratory for the diagnosis of a sinus thrombosis, yet a blood culture as a definite part of the examination might be well considered a necessity, such a culture being taken at the time of the mastoid operation, and as a result of my experience this has conclusively demonstrated that mastoid disease per se does not produce a bacteremia. Illustrative are the following cases:

Female, 12 years of age. Complained of pain in the left ear and a slight purulent discharge for two weeks. I first saw her in consultation when she was unconscious, with a

temperature of 106.5 degrees and an acute mastoiditis, with the physical conditions indicative of intracranial involvement. Double Kernig and McEwan signs. Blood culture showed streptococci, and immediate operation was advised. The entire mastoid was removed, the sigmoid sinus plate was found necrotic, and its removal exposed a contracted sinus which, with the mastoid emissary vein, was thrombosed. There was a fistula in the roof of the antrum, and about two drams of greenish pus under great pressure were evacuated. The dura was congested, bluish-black and was bulging. It was incised. The brain was found much congested and friable, with adhesions over a large area. The vertical limb of the sigmoid sinus was then incised and a fresh clot was removed, which was followed by the escape of blood from both ends of the vessel. Blood culture showed four colonies of streptococci to each cubic centimeter. There was a polynuclear count of 90 per cent and a leucocytosis of 31,000. A blood culture taken two days later was sterile, and the patient, after passing through an acute encephalitis, entirely recovered.

Female, 22 years old. Grippe, followed by perforation of the left membrana tympani, and four days later it was necessary to incise the right drum membrane. Suddenly high temperature developed, with vertigo, nystagmus, nausea and vomiting, and symptoms referable to mastoid involvement. Cerebration was slow, the tuning fork showed diminished higher tones. The left mastoid was opened and the sinus exposed, which latter appeared normal. Two days later the right mastoid was operated upon. The sinus was well forward. There was a leucocytosis of 19,000, temperature 104 degrees, polynuclear 86 per cent, and five colonies of streptococci to the cubic centimeter. There were chilliness, restlessness, headache and nausea, and I determined to explore the sinuses. The left was normal, while the right was thickened, striated, and on incision there was no free bleeding for some seconds; then followed a free gush of blood as the thrombus was washed out. The temperature was normal for the next three days, yet the blood cultures showed an increase in the colonies of from 5 to 60 per cubic centimeter. Then there was a chill; the temperature rose to 103.8 degrees. The right internal jugular vein was excised from the clavicle to the bulb, including a chain of enlarged glands. Above the

facial vein the jugular was white, flat and densely adherent, and streptococci were present in its walls. Three days later a blood culture was sterile, and the patient went on to an uneventful recovery.*

The value of a positive blood culture in such cases is self-evident, and on account of the number of atypical cases in which the clinical signs do not allow early definite diagnosis, its value cannot be overestimated. Another factor of value is its aid in determining whether the jugular vein shall be ligated or not, after the mastoid has been opened, for in the presence of a positive blood culture we have a much more accurate and definite working basis than in the clinical symptoms alone, which are so often atypical and misleading. As an example of this, accept for consideration a case in which the mastoid operation has been performed and evidences of sinus thrombosis develop, or which may be present at the time of the primary operation, and the sinus is opened. The blood cultures are found to be positive and remain so, even in the absence of signs of jugular involvement. The logical deduction under such circumstances would naturally be that a general systemic invasion is still going on. That this takes place via the jugular vein is reasonable to conclude, in view of the constant conversion of positive into negative cultures after a jugular ligation. A case illustrative of this is that of a young man who, three weeks after a mastoid and sinus operation, had practically a normal temperature and no neck symptoms, yet complained of constant frontal and temporal headache. Blood culture showed 230 colonies of streptococci to each cubic centimeter. The jugular was ligated and found thrombosed, one portion of the thrombus being well organized, while the other had broken down. The patient made a good recovery. Here the definite diagnosis was established only by the blood culture.

The work of Libman and Celler is most valuable and instructive, as they found as a result of 163 blood cultures in 100 cases, that positive results were obtained only when the aural condition was complicated either by a meningitis or sinus thrombosis. In the former the pneumococcus

*This case was among my first in the series and I was disinclined to operate until clinical signs were present, so I disregarded the laboratory findings.

and streptococcus mucosus were found in the blood. In an earlier series of 14 cases of thrombosis, cultures were positive in 9, being equal to 64 per cent; while in 16 later cases, they were positive in 14, or 87½ per cent, making a total of 30 cases with 23 positive cultures, or 77 per cent. In about 100 cases of suppurative otitis media or mastoid disease without sinus thrombosis or meningitis, the blood culture was sterile in every instance. As stated by Libman and Celler, the early authorities considered the pneumococcus as the most common organism in acute suppurative otitis media, but more recent investigators find it to be the streptococcus, and in their study of 360 cases, streptococcus pyogenes was found most frequently, the streptococcus mucosus next, and the pneumococcus in the smallest number, while it is a significant fact that no case of sinus thrombosis in this series of fifty cases was due to the pneumococcus.

Regarding the presence of bacteria in the blood, they were not found in simple otitis media, mastoid disease, extradural abscess, or in brain abscess, and positive cultures were obtained only in cases of meningitis or sinus thrombosis. It will be found that the earlier the cultures are taken, the more frequently will positive results be obtained, but it is possible to obtain negative results even though the clot has disintegrated and passed through the jugular vein to form metastatic foci in various portions of the body. Cases in which the streptococcus was found in the blood after the mastoid had been properly operated upon and in which clinical symptoms still persisted, always presented thrombosis of the sigmoid sinus. In those cases where prior to the mastoid operation the local evidences are insufficient to account for the temperature and general disturbances, a positive culture would indicate that there is a more serious lesion than would otherwise be suspected, while in another class of cases where the sinus has been exposed and the clot removed, the persistence of streptococci in the blood has been the only indication to ligate the jugular vein, and in such cases it will be found that the streptococci disappear from the blood very rapidly following this procedure. In one instance the bacteria disappeared from the blood within four hours after the jugular vein had been ligated.

The report of Gruening very clearly enunciates the great

value of blood cultures. In ten cases of lateral sinus thrombosis the blood taken from the median arm vein before ligation of the internal jugular, was positive in 7 and negative in 3. In all, the same organism that was present in the blood was also in the discharge from the ear; 5 being streptococcus pyogenes, 1 streptococcus mucosus and 1 bacillus proteus. The internal jugular vein was ligated in all these cases. While the diagnosis of sinus thrombosis was made from the clinical symptoms alone and the blood culture was not necessary excepting for corroboration, it was important as showing the relation which sinus thrombosis bears to systemic infection, and this relation once established will assist in a proper appreciation of obscure cases in which clinical data are insufficient for the recognition of thrombosis of the sinus. That a positive culture can be advantageously used as important evidence of the presence of a thrombus, has been repeatedly demonstrated and patients who, after a thorough mastoid operation, do not do well and whose temperature remains high though accessible parts of the sinus appear healthy, improve immediately on ligation of the jugular vein deemed advisable as the result of continued positive blood cultures. In two cases admitted to the medical ward of Mt. Sinai Hospital with high fever, systemic infection and no recent previous history of ear disease, the diagnosis of sinus thrombosis was made by exclusion of other foci, in the presence of a positive blood culture, and in both cases the lateral sinus was found thrombosed, though with the exception of an old perforation of the drum, there was no evidence of an active ear disease. Both cases recovered after the evacuation of a thrombus from the lateral sinus; one with and one without ligation of the jugular vein. The clinical data prove that streptococci in the blood do not necessarily lead to a fatal issue, but where the internal jugular vein is ligated, a more favorable prognosis is permissible.

As a result of the experience of the various authors quoted here, and that of my own, it is apparent that a large field of usefulness exists for the study of blood cultures in these obscure cases and undoubtedly the presence of a bacteremia in a patient with otitic disease under the conditions mentioned above means that sinus thrombosis is also present. Duel and Wright, however, in a study of 55 cases of otitic disease

and two of frontal sinus suppuration, claim to have found a positive bacteremia in 16, 4 of which had definite clinical signs of sinus thrombosis, one acute diffuse leptomeningitis, one acute suppurative otitis media without mastoid involvement and 9 cases of mastoiditis without complications. They found streptococcemia present in all cases with clinical symptoms of sinus thrombosis and in the case of diffuse leptomeningitis, but in the 9 patients without any alarming symptoms, 7 had streptococci and 2 pneumococci in the blood, and as a result they arrived at the conclusion that when the clinical symptoms are pathognomonic of sinus thrombosis, a bacteremia is only a valuable additional confirmatory sign in connection with such symptoms. Their technic consists in inoculating broth with ten c. c. of blood and incubating it for two or three days and then centrifugalizing it. They claim to have demonstrated that in about 30 per cent of cases with trifling symptoms of otitis, there are one or more colonies of streptococci in each ten c. c. of the patient's blood, so that the proportion of cases actually having a bacteremia must be much higher than the figures would indicate. They also claim that in four other patients, they obtained positive cultures in simple mastoiditis with no clinical evidence of sinus involvement and uneventful recovery took place in all, so that they state they have proven that a bacteremia does exits in such uncomplicated cases. Dr. Duel also stated, however, that the early recognition of streptococcemia by means of blood cultures would undoubtedly lead to earlier operation and cause more gratifying results in many doubtful cases of septic sinus thrombosis.

The work of these otologists just quoted, differs from that of others and does not agree in any way with our experience, which consists at present of blood cultural investigations in about 130 uncomplicated mastoid cases with a negative blood culture in every instance, and 50 sinus thrombosis cases with 42 positive cultures.

The unique bacterial findings in the blood so frequently, as Duel and Wright indicate, is unexplainable, unless it be on the basis of differences in the cultural methods used. Surely it is unsubstantiated by any other reports in the literature and in no way vitiates our findings as is here clearly indicated. The method employed at Mt. Sinai Hospital laboratory by

Libman and Celler consists in dividing equally about 15 c. c. of blood among bouillon flasks and agar tubes, pouring the latter into plates immediately. Both bouillon and agar were used with and without glucose. In some instances serum was added to the various media. Subcultures were made from the flasks daily. The principal points of difference between the two methods consist in the concentration of the blood and the centrifuging. Libman and Celler, as a result of further studies on this subject, state that it is worthy of note that in not a single instance was the pneumococcus isolated either from the blood or from the sinus clot where this could be investigated. It is generally found that the original middle ear infection within a very short time becomes admixed with other organisms. But the pus in the mastoid or sinus remains dependent on a single organism and a pure culture is obtained from this source. A definite uniformity exists, however, in the predominating organism found in the middle ear discharge and that found at operation in the mastoid, and this fact, to my mind, emphasizes the great importance of taking cultures from the middle ear. "The organisms obtained from the blood in cases of thrombosis of the sinus, invariably corresponded to that isolated from the mastoid with one exception, and from the studies thus made, they conclude that nearly all cases of sinus thrombosis are accompanied by a bacteremia at some time or other and that cases in which streptococci are found in the blood after the mastoid has been properly operated upon and in which clinical symptoms persist and no other cause can be found for the streptococcemia are cases of sinus thrombosis."

Comparing these results with those of Duel and Wright previously mentioned in which they state that the bacteremia bore no relation to the sinus disease, they are therefore quite at variance with the result of the authors mentioned. Duel and Wright found streptococci 14 times and pneumococci twice. The relative high percentage of the latter is of particular interest. In endeavoring to confirm the method employed by Duel and Wright, Libman and Celler utilized it in 42 cases. They state they employed this method in 27 cases (22 mastoiditis and 5 otitis) and their own method in 82 mastoid cases and 16 otitis cases, 98 in all, and there was not a single positive culture. "To determine the possibility of a bacteremia without clinical signs in local infections other than

those of the ear, a study of 66 cases was made both by the Wright method and controlled by their own method.* This included empyema of the chest, abscesses of various parts of the body, erysipelas of the hand, pyonephrosis, perinephritic abscesses, septic infarcts of the kidney, appendicitis, furunculosis, multiple streptococci abscesses, carbuncle of the neck, paronychia, suppurative adenitis, phlegmon of the hand and neck, etc., and the results were uniformly negative in every instance.

Our results agree in all respects with those of Leutert, in which he states that every case of bacteremia of otitic origin with the exception of meningitis, is accompanied by sinus thrombosis, and no bacteremia ever occurs in uncomplicated cases of mastoiditis."

These investigators also state, "As the result of later studies, that they find no justification for altering the opinions already expressed concerning the relationship between bacteremia and diseases of the ear."

The appearance of the bacteria in the blood stream from a sinus thrombosis, is the result of their separation from the primary focus, and their multiplication in the blood, or their presence later may be the result of a septic endocarditis, in which case the latter must be differentiated by the clinical symptoms, before the aural condition can be proven the cause of the bacteremia. However, in case the bacteria have been deposited in various portions of the body, it does not necessarily follow that all foci show bacterial activity at the same time, as some areas may become quiescent, while others become active in sending out organisms through the general circulation, although the bacteremia may in rare instances be continued from its original source in an indirect manner, as even after the jugular vein has been ligated, the bacteria may enter the general circulation by way of the petrosal sinus, or as the result of a concomitant meningitis, but in the latter instance the meningitis is readily recognized both clinically and by means of a lumbar puncture. At some time or other during the course of an infective lateral sinus thrombosis, a bacteremia always occurs even in acute cases where there is a parietal clot, that is before a complete thrombosis of the ves-

*An unpublished report made at a Mt. Sinai Hospital Clinical Conference Meeting.

sel has had time to form, and a blood culture will generally show a positive result, from the microorganisms present in the particular case being washed off in the blood stream from the inner areas of the partial thrombus. In some cases, however, no bacteremia will be present very early; but within a short time thereafter repeated blood cultures will show a gradually increasing number of colonies. Experience has also shown that they may decrease in number and entirely vanish, even before any operative procedures have been employed. In long standing cases where the patient is doing well and yet presents clinically a certain degree of sepsis, there may be no bacteria found in the blood, as the thrombus may have been disintegrated and particles carried to the lungs and lodged there. The bacteria are then confined in these emboli and remain localized in the pulmonary areas, either to become innocuous there, or more frequently to form septic infarcts. The explanation for this negative culture is in the antibactericidal action of the blood and the walling off of the lower end of the thrombosis by sterile clot.

A bacteremia of the streptococcus type associated with the usual symptom complex of chills and a septic rise and fall in the temperature, may also be found, where there is a thrombus of other venous channels of the body and especially so in the pelvic veins of the genito-urinary tract, or of other cerebral sinuses, or of the veins of the extremities, as well as in sigmoid sinus diseases. When the symptoms arise from a thrombus of the extremities, there is marked local evidence of the disease, so that the cause of the streptococcemia is plainly evident, while when the other intracranial sinuses are the seat of a phlebitis, local symptoms are in evidence, and the study of the case aids in elucidating the condition.

The presence of a bacteremia is most suggestive in the absence of such other possible causes as have been enumerated; and when there is a history of the presence of suppurative aural disease or where the symptomatology is obscure and an acute or chronic suppurative otitis is present, even though an endocarditis may also be present, it is advisable by all means to explore the sinus. The detection of a bacteremia should be possible in practically every case of sinus thrombosis and as further studies are made, the sources of error will undoubtedly become less and less. Negative findings may be ob-

tained, however, and they may be the result of various causes, such as a sterile thrombus situated below the infected clot, which for a time at least might prevent a bacteremia from becoming evident, or the cultures may be taken before the bacteria are thrown off into the circulation. In the latter instance if a culture were taken a few hours later, the organisms would be found. It is also possible that the powers of hemic resistance being greatly increased, all the circulating bacteria might disappear within a comparatively short time by a highly developing bactericidal power of the circulating fluid, or it is possible that there may be such a small number of organisms in the blood that, in the minute quantity examined, they may not be found. The number of colonies in each cubic centimeter has varied widely, in our experience being from one to 320; or again the culture may be taken too late in the course of the disease, after all the organisms have disappeared from the circulation; this is always the case within a comparatively short time after the jugular vein has been ligated, so that the original focus of infection is thus cut off and isolated as it were; our experience showing that not infrequently the blood becomes sterile a long time before the clinical symptoms disappear.

Illustrative of this point is the case of a young woman recently operated upon. A large and firm thrombus was removed from the bulbar region. Owing to the critical condition of the patient on the operating table no attempt was made to ligate the jugular vein. Thirty-six hours later the clinical symptoms were so severe that it was determined to proceed. However, the culture taken between the first and second operations and reported only after I had already ligated the jugular was negative.

It must also be remembered that there may be an entire absence of a bacteremia, yet the patient will show metastatic deposits in various portions of the body, as the result of a previous sinus thrombosis accompanied with streptococci in the circulation, which has been operated upon and entirely removed as a focus for infection. Such cases are the result of the early breaking down of a part of the septic thrombus, with a distribution of the microorganisms. This has ceased at an early stage and the local focus no longer acts as a factor in the septic dissemination and then for a time the blood is sterile,

while at a still later period the various metastatic deposits commence bacterial activity and local abscesses result; so that one can readily see that at some time during the course of the primary sinus thrombosis, the presence of organisms in the blood is an essential fact, as their distribution is necessary in this way for emboli to be carried to various parts of the body.

Following a mastoid operation where a sinus thrombosis is suspected, but where the symptoms are not sufficiently definite to warrant opening the sinus and a blood culture has given negative results, it is most esssential that a second culture be taken, usually within a day after this time, and if it is then found positive, the indication is clear. In case the condition still continues suspicious and yet the blood remains sterile, repeated cultures should be made and they will be found of great value in finally clearing up an obscure case that otherwise might not be relieved by operation until a much later period. The rule can be laid down that in the presence of streptococci in the blood, there is a septic focus, and it is a definite indication that further operative measures are necessary.

Such findings should lead one to examine the ears, even though there are no symptoms calling attention to these organs. Several such instances have occurred in our experience, patients having been admitted to the medical wards as typhoid suspects. Given a patient presenting a rise in temperature accompanied with chills and a blood examination shows the presence of streptococci, it is good surgery to explore the mastoid process and lateral sinus, provided that another cause for the condition cannot be found and that there is established the absence of a primary infective focus elsewhere.

Whiting, in discussing one of the papers previously quoted, asks the question, given a suppurative otitis media, and a blood culture showing the presence of streptococci, is one justified in making the diagnosis of a purulent lateral sinus thrombosis? If one can eliminate endocarditis, erysipelas, streptococcus pharyngitis and other septic foci, and if the above conditions prevail, one is justified in seeking for a thrombus in the sinus, for one may be reasonably certain that the bacteria in the blood are getting there from the infected ear. Whether under such circumstances one should tie the jugular vein in

every instance, we have not sufficient data at present to say, but certainly the presence of streptococci in the blood in connection with a suppurative otitis media, leads to the conclusion that it is a wise procedure.

Of the fifty cases of sinus thrombosis here referred to, in forty-one the internal juglar vein was ligated and exsected. In those cases where this was not done at the primary operation, over ninety per cent subsequently required this procedure.

The persistence of streptococci in the blood after the sinus has been operated upon and the thrombus removed, indicates that the internal jugular vein is the seat of a phlebitis and that the infected thrombus there is acting as a disseminator of microorganisms, and even should local or general symptoms of such a condition be absent, or should they be so slight that they alone would not warrant operative interference, yet my experience teaches that the blood findings are sufficient indication for further operation. The number of organisms found in the blood, however, in the presence of a lateral sinus thrombosis, whether accompanied with jugular involvement or not, bears no relation to the extent or severity of the blood infection, as an extremely severe case may show a minimum number of organisms to the cubic centimeter, while a comparatively mild case, relatively speaking, as all these cases must necessarily be considered grave, may show a great number of colonies obtained from the blood culture. A rapid decrease in the number of bacteria in the blood after operation as a rule can be construed as a favorable prognostic sign.

From the number of cases which I have studied with reference to the phenomena of bacteremia in relation to otitic suppuration, it can be definitely stated, in conclusion, that the finding of a bacteremia in the presence of a suppurative disease of the middle ear and its adjoining osseous spaces is proof evident that there is an infective thrombosis of the sigmoid sinus, and such a finding is warrant for immediate operation, while following sinus operation, the persistence of streptococci in the blood indicates that the internal jugular vein is involved, and measures for its operative relief should be at once carried out.

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XV.

CASES OF AURAL SUPPURATION PRESENTING IRREGULAR SYMPTOMS

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As it is the unusual in medicine, as in every other science, which interests, I beg to report very briefly three cases of aural suppuration which furnished rather unusual clinical pictures:

Case 1. A boy about twelve years of age was admitted to my service at the New York Eye and Ear Infirmary, suffering from a chronic suppuration of the left middle ear. A radical operation was performed by one of my assistants and a primary graft applied. About four days after the operation the patient had a slight elevation in temperature and slight nystagmus toward the healthy side. The patient seemed to feel perfectly well and, aside from the temperature elevation and the slight nystagmus, presented no other unusual symptoms. The primary graft was removed and the wound packed. A slight infection of the superficial wound was present, and it was thought that this might explain the temperature. The wound was therefore freely opened and a wet dressing applied. For three succeeding days after the onset of the untoward symptoms, the temperature would be normal or nearly normal in the morning and would rise to 102° or 103° in the afternoon, the daily exacerbations becoming higher. Rotation showed the labyrinth of the affected side was dead. Blood cultures were negative. The original infection was streptococcic. Owing to the excursions in temperature, I was convinced that, in spite of negative blood cultures, we had to deal with a thombosis in the lateral sinus, and consequently asked my assistant to explore the sinus. This was done and the sinus was found to contain fluid blood, there being a very profuse hemorrhage both from the lower and upper end of

the sinus when this vessel was opened. The wound was packed in the ordinary manner and the patient returned to bed. The next day the temperature fell to normal in the morning, and the differential blood count, which had previously shown a high polymorphonuclear percentage, showed a diminished number of these cells. In the afternoon, however, the temperature again rose to 104°. The blood culture was still negative. Reasoning that a partial clot lying in the jugular bulb might give rise to these symptoms, although its size might be quite insufficient to cause any obstruction to the blood current, I removed the internal jugular on the day after the sinus was opened. The vein contained no clot, but seemed somewhat thickened at its upper portion. Unfortunately, the vein was not examined microscopically. The wound in the neck was closed by primary suture, a deep drain of folded rubber tissue being introduced throughout the entire length of the wound.

On the day after the jugular was removed the temperature rose to nearly 104° in the afternoon. After that the temperature remained down steadily, and the patient made an uninterrupted recovery. A blood culture taken immediately after the removal of the jugular, showed the presence of streptococci. This is in direct opposition to the teaching so frequently laid down—that the removal of the jugular causes a disappearance of the streptococcemia.

This patient never had a streptococcemia until after the jugular was removed, and yet the removal of the jugular caused a complete abatement of all the symptoms of sinus thrombosis, and the patient went on to complete recovery. The wound in the neck healed throughout by first intention.

So much has been written recently regarding the value of the differential blood count and of blood cultures, in these cases, that it seems worth while to report a case of this character, in order to show that we must, after all, depend more upon our clinical symptoms than upon the laboratory findings. True, had we allowed this case to progress, we would undoubtedly have found streptococcemia, and would have removed the jugular at a later day. The best interests of the patient, however, were conserved by performing an early operation, and thus shutting off the focus of general infection before any general systemic involvement had occurred.

CASE 2. The patient was admitted to St. Luke's Hospital with a history of grip followed by a feeling of general malaise. Four days before his admission he suffered from severe pain in the right ear, and examination at the time of his admission to the hospital showed an acute inflammation of the right tympanic cavity. The right drum membrane was incised and considerable pus evacuated. The temperature, which was about 104° on admission to the hospital, fell considerably after incision of the drum membrane, but rose again to 104° the day after. The patient's temperature and general appearance suggested a beginning typhoid fever. The Widal reaction was indefinite on the first day. When I saw the patient, the right tympanic cavity was draining freely, there was very slight tenderness over the right mastoid, and the patient complained of moderate spontaneous pain in and about the ear. The polymorphonuclear count was somewhat elevated.

I advised observation for forty-eight hours, and if, at the end of this time, typhoid could not be diagnosed absolutely, that the mastoid should be opened and the sinus explored. I did not hear from the patient again until seventy-two hours after the time of my first visit, at which time the report was made that the Widal was less distinctive than before, and that the temperature had shown the marked fluctuations which had characterized the first two days' clinical history of the illness after admission to the hospital. I advised, therefore, the opening of the mastoid, exploration of the lateral sinus and excision of the internal jugular, provided no occlusive clot was found in the sinus. At the operation a few drops of pus were found in the mastoid cells. The sinus contained fluid blood and bled freely when opened. The jugular was excised in the usual manner. Three days afterwards the patient's temperature became normal, and he went on to a rapid recovery. In this case, the general history seemed to point to typhoid, and the patient's appearance certainly suggested a beginning, "continued" fever. The aural history was remarkably short for a case to develop symptoms of general sepsis, and for the first few days I was in doubt regarding the diagnosis. The absence of definite symptoms of typhoid, however, the presence of aural suppuration and the fluctuations in temperature determined the plan of procedure. The blood culture in this case was negative.

In these two cases, the point of interest is the success of removing the internal jugular, in spite of the fact that the sinus seemed practically normal on inspection and palpation. Where a clot in the lateral sinus is of sufficient size to occlude the lumen of this vessel, I believe that opening the sinus and removing the clot may cause a cessation of all symptoms, and that this procedure, in cases of this character, may be carried out with hope of success in a certain proportion of cases without interference with the internal jugular vein. If, however, septic symptoms are present while the sinus seems normal, we can only suppose that these symptoms are caused by a small parietal clot, and occlusion of the sinus will not prevent general absorption. The only relief to be obtained, in these cases, is the removal of the internal jugular, thus shutting off the localized focus of infection from the general circulation.

It is probable that in both of the cases above narrated, the clot lay in the jugular bulb and was parietal.

Case 3. A third case of interest was that of a patient upon whom I did a submucous operation about four weeks before the onset of his aural symptoms. The patient was in good general condition. The septal operation was exceedingly difficult, owing to the presence of adhesions between the displaced septum and the inferior turbinate of the occluded side. These adhesions made it necessary for me to tear the mucous membrane on the occluded side, in correcting the nasal obstruction. The patient did very well for about three weeks, when he contracted a severe cold in the head. One week after his cold he had an acute otitis upon the left side. This was mild in character, and the fluid evacuated, upon free incision of the drum membrane, which was performed eighteen hours after the inception of the acute otitis, was only a serous fluid, which showed no definite microorganisms, a few unclassified diplococci being present. The patient's temperature on admission was about 100°. It rose to 101° after incision of the drum membrane, but fell to about 99° on the following day. The discharge from the ear was very slight. On the day after the operation the temperature rose to 102° in the evening, and on the second succeeding day, at the same hour in the evening, rose to 101°. The patient lived in a town where true intermittent fever is common and gave a history of well-marked attacks of intermittent fever. For this reason, he

was placed upon twenty grains of quinin daily. The diurnal excursions in temperature immediately became less, and the temperature did not go above 99° or 99½° in the evening, for a period of three or four days. The patient, however, had profuse sweats, and did not seem to be gaining strength. Owing to the mild character of the febrile movement, no blood examination was made, as I did not feel that the plasmodium would be in evidence. Ten days aftter the patient's admission, the temperature suddenly rose to 102°, fell to normal, and the next day rose to 102°. Examination of the blood on this second day showed no plasmodium present; the polymorphonuclear percentage was 78 per cent, and the white blood count was 5,200,000. The patient at this time had a slight bronchitis. I should have mentioned that the spleen was slightly enlarged at the first examination, and this sign was also present at the time of the last febrile attack. During this period, the middle ear suppuration had progressed favorably. The discharge had diminished in quantity, drainage was free, and there had never been more than the very slightest mastoid tenderness, and this was so ill-defined that it could scarcely be called "true mastoid tenderness." At the time of the acute attack there had been a hemorrhagic external otitis present, but this had gradually disappeared. In other words, the ear symptoms had progressed favorably for about ten days, and yet, at the end of this time, we had a rather pronounced febrile movement. The patient was examined by an internist, and several possibilities presented themselves. The temperature might be due to the slight bronchitis from which the patient was suffering, might be due to masked endocarditis, to sepsis from the ear, or a beginning typhoid. The relatively small leucocyte count seemed to be in favor of typhoid. Malarial infection was, naturally, ruled out, on account of the failure of the temperature to respond to large doses of quinin. On the second day of the febrile movement, the polymorphonuclear percentage fell to 68 per cent, and a blood culture taken twelve hours before was negative both for typhoid and streptococci. No medication, other than small dose of bromide, was employed. The patient's temperature fell to normal, and he made an uninterrupted recovery. What the exacerbations in temperature were due to, I do not know, but the case seems worthy of report, in conjunction with the other two cases mentioned above.

XVI.

A CASE OF SINUS THROMBOSIS, WITH EXTENSIVE ACCUMULATION OF FLUID PUS IN THE SINUS—RECOVERY AFTER RESECTION OF THE JUGULAR VEIN.*

By Robert L. Loughran, M. D.,

New York.

The patient presented as a case of sinus thrombosis, with extensive accumulation of fluid pus in the sinus, is six years of age. He was admitted to the Manhattan Hospital on July 1st with a history of an attack of measles beginning on May 11th, which had entirely cleared up in two weeks. During this time he had had a double acute purulent otitis media. The left ear had entirely cleared up in two weeks and the right had become normal after about three weeks. During the otitis he had had pain only at the onset, before the discharge appeared, both drums having ruptured spontaneously. During the first week the temperature had been as high as 103°. The boy was perfectly well for two weeks following the disappearance of the otitis.

Ten days before admission to the hospital he had been taken suddenly ill with a chill and a severe general headache, especially marked in the occipital region. For several days it was thought that he was developing a meningitis, the pain being of that type. The onset of the headache had been accompanied by an earache on the right side, which was referred to the mastoid bone rather than to the middle ear. Examination of the drum had not given any evidence of middle ear involvement. There was no prolapse of the posterior canal wall. There was no discharge. There was no evidence of pain on pressure over the mastoid bone until within two days previous to admission, and even then it seemed to be

*Read before the Section on Otology, New York Academy of Medicine, October 14, 1910.

about equal on both sides. There was at this time pain on pressure over the location of attachment of the sternomastoid muscle and a distinct swelling at this point was noticed. The temperature had been apparently variable, some days going as high as 105°, with a remission to 100° or so, but these excursions had been irregular. During the ten days the boy seemed very ill and the severe headache had persisted.

On admission he had a temperature of 104°, pulse 140. General condition good. He complained of some headache and a pain which he located over the tip of the mastoid, extending down along the sternomastoid muscle. An enlarged gland was discernible below the tip. Pressure elicited pain over the tip, but especially over an area of about one inch in diameter posterior to the antrum. There was no sagging of the posterior wall and the drum, while congested, was not bulging at all. It gave the appearance of an acute otitis in which exudation of serum had not taken place. The drum was incised freely under gas, and a very small amount of bloody serum evacuated.

The next morning his condition remained the same, both as to pain and the appearance of the posterior canal wall and drum membrane, there being but a slight discharge of blood-stained serum, which on bacteriologic examination, showed the presence of staphylococci. The temperature rose to 105° and the mastoid was opened. A small amount of seropurulent material was found filling a small antrum, as well as a few cells extending down toward the tip. The bone was markedly eburnated for the age of the patient. The sinus was found to be placed very far foward, leaving a space of only about a quarter of an inch between it and the posterior canal wall. The sinus was exposed for about a half inch in diameter, was congested, bright red in color, but smooth and apparently not thickened. The dura covering the middle fossa was quite low and was exposed for about a quarter of an inch in diameter, and was found to be hyperemic. There was, therefore, a very close association between a very small antrum, the dura and the sinus wall.

For the next five days the temperature ranged from 99° to 102°. The boy reacted well and his general condition was excellent. On the day following the operation a blood examination showed a leucocytosis of 22,444; red cells, 4,720,000;

polymorphonuclear percentage of 71. The wound was dressed on the third day and seemed satisfactory in every way, although there was no evidence of any beginning granulation over the region of the sinus. The sinus, however, looked perfectly healthy, as far as the color was concerned. On the fifth day the temperature rose to 104.4°. The wound was beginning to granulate in a satisfactory way, except over the sinus, which still looked in good condition. Next morning the temperature was 98.6°, and in the afternoon was 103°. The boy was feeling well and his general physical condition was satisfactory. A blood count on this day showed a leucocytosis of 13,777 and a polymorphonuclear percentage of 66. On dressing the wound next morning there was an appreciable change in the condition of the cavity. While the bony wall showed a satisfactory tendency toward beginning of repair, but not advancing rapidly, the sinus wall had ceased to have a healthy appearance. Its surface had become thickened and roughened and of a distinctly grayish color. There was, however, no change in the patient's general condition. He was sleeping well, was having no pain. He had had no chill or chilly sensation since the operation on the mastoid. It was decided to open the sinus.

On curetting the surface, a small necrotic spot was uncovered, through which fluid pus escaped on manipulation. It was apparently under pressure. The sinus was exposed from a point as far as possible down into the tip, upward toward the torcular, a distance of over two inches, before the wall began to lose its thickened appearance and its grayish color. This was incised for the full length of the exposure and the lumen found to be filled with a yellowish fluid pus for fully an inch and a half, which was walled off from the rest of the sinus by plugs of degenerating blood clot. Bacteriologic examination of this pus found it to contain the bacillus pyocyaneus and staphylococci. The torcular end of the sinus was curetted for a distance of about three-quarters of an inch, removing a mass of degenerating blood clot. This was followed by a free hemorrhage. Degenerating blood clot was likewise curetted from the bulbar end as far down as the curette could pass, but there was no hemorrhage following. The jugular vein was resected throughout its full length in the neck. It showed no macroscopic appearance of infec-

tion, but its contents showed on microscopic examination the presence of staphylococci. There was a large gland just below the tip of the mastoid, which was excised.

The boy did well following the operation, had no chill or chilly sensation, slept well, but did not take nourishment well. The mastoid wound began to granulate immediately. With the removal of the torcular end plug on the fourth day, there was no hemorrhage, and this region, along with the rest of the wound, looked perfectly healthy. The bulbar end ceased to have a purulent discharge at the end of a week, and when the patient was discharged from the hospital at the end of a month following the first operation, the wound had granulated almost to the surface and the boy was perfectly well.

The chief points of interest in the case are these:

The course of the infection from a latent infected process in the mastoid antrum, directly into the sinus without any lighting up of the subsided otitis media.

The slow development following the chill without other symptoms than the irregular excursions of temperature, and the severe headache, which probably could have been localized along the course of the sinus.

The failure of the sinus wall to be materially involved along with the infective thrombosis, until disintegration of the thrombous was well begun.

The slow development of a septic thrombus of staphylococcic origin, its disintegration in the central portion and its gradual advancement toward each end.

62 W. 52d Street.

XVII.

MECHANICAL AIDS TO HEARING.*

By Percy Fridenberg, M. D.,

New York.

While I have prepared no formal paper, I thought it would be interesting to have this subject brought up for discussion, for, after all, the important thing is the question of practical experience. It means much more than mere theory.

I shall not attempt to describe the various forms of mechanical aids to hearing, but shall speak about two types. The further back we go the more we find in the books about mechanical aids to hearing. Present-day books say very little about them. All of the recent advances have been surgical. The patient's health is the first consideration, after that the restoration of hearing. But, after all, the restoration of the function of the ear is a most important matter to the individual. If we consider the number of mechanical aids that are on the market and the number of people who are hard of hearing, it is very strange that we do not see more of them in use.

One reason for this is the vanity of deaf persons. The average deaf person is more self-conscious than the person who has lost his sight, and the deafness has to be very pronounced before he will make use of any mechanical aid.

They began to try to get mechanical aids that would not be visible, but these have practically all been given up. They were of most use in those cases where there had been a suppuration in the middle ear which had healed, leaving a defect in the drum. The attempt was made to restore the continuity of the membrane, but the great objection was that in introducing a foreign body into the ear it was liable to set up an inflammation that might not be cured. For that reason, that special form of artificial ear drum is best supplied by a

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little bit of cotton. Some men have had very good results by covering the opening with a little piece of paper, but no one form of mechanical aid has been of much value. They are all more or less useless and more or less dangerous.

Sounds can be brought to the deaf in two ways. Either we could bring the person to the actual source of sound, as when we approach our lips to the ear, or by collecting the sound over a large area and preventing it from being lost in space. There are two types of sound-transmitting instruments—the tubes or sound receivers, and the resonators or trumpets. The ordinary speaking tube carries sound very distinctly. Ordinary conversation can be carried on for 1200 feet with absolute distinctness. We hear so much worse in air, for there is an exit of the vibrations in every direction, and only a small amount of the vibrations come to the ear. If we can keep a large part of the sound and bring it to the ear, there is a magnification. There are coiled conversation tubes for that, which are used from one person to another. Where it comes to hearing music or conversation in a large room, it must be replaced by something else.

Then we have sound receivers. The magnification of sound depends on concentration, conduction and resonance.

The sound receiving apparatus depends on the fact that the air wave sets in motion some medium denser than air, which does not lose itself. The sounding board of the piano, and the case of the violin depend on that principle. When the air waves set wires, wood or metal in vibration it is kept up for a long time, and thus this resonator is made. The oldest form of applying this aid is by putting the hand behind the ear. That puts the auricle in better position to collect the sound in the ear. Politzer says that in over half of his cases this method was as good as any hearing trumpet, and was only inadequate in extreme cases of deafness.

In recent times they have taken advantage of certain physical innovations. First of all the microphone. The ordinary microphone is simply a flat box with a very delicate film of flexible metal in it, so that the air waves set that little plate in vibration. That was held close to the ear, so that no air waves could escape into the atmosphere. When the telephone came out, the same principle was used, with the addition of a secondary battery. All the instruments that come

out now consist of a small receiver, a small battery in the ear, and a microphone transmitter. Instead of its being suspended in any point, it simply rests on a number of small grains of carbon. If you will take up one of these you will hear a fine rattle inside. That is called the loose contact. The advantage of that is that you can get a very much more delicate reaction to different intensities of sound and consequent flexibility.

A slight sound will bring it into contact with one or two carbon grains without deflecting the plate as a whole or bending it in any way. One of the disadvantages of the electric microphone, the acousticon and others of this type is that the slightest motion of the receiver will make those little grains move around, and you have a constant noise in the ear, which is accentuated by the receiver, and many find that so objectionable that they have given up these electrical instruments altogether. The acousticon people tell me that if you put the instrument on the table and not wear the receiver, so that the grains are not thrown about, the secondary sounds in the ear will disappear, but this is a great annoyance. Also, they accentuate a great many varieties of sound at the same time, and people who have accustomed themselves to picking out the sounds which are of interest to them and so hear fairly well, find themselves troubled and confused. But there is no doubt that by using these instruments they get accustomed to them and hear very much better than before, and it is a question whether any improvement is due to the instrument.

The pathologic terms used in the various prospectuses are very pathetic. All of these electrical appliance people have a vibrator which they sell with the mechanical aid to the hearing. It simply produces a loud rattling noise. It is certainly a very coarse method of producing any massage effect, and I have never heard of any good results that could not be better obtained by the physician himself.

I have made a few tests on patients. I have had only one or two cases of bona fide nerve deafness where I could make out absolutely the involvement of the nerve, and in those cases I could not get any benefit from any of the commercial aids. The old chronic middle ear catarrh seemed to do best.

I have brought here tonight one or two of the standard aids, which I will show. I forgot to mention in passing that

one of the oldest forms is the socalled dentophone or audiphone, which was supposed to take the place of air conduction entirely. That type was held between the teeth, and the air waves were supposed to be carried by the fan (phone) to the internal ear. I have found one or two references in literature to it, but no one seems to think much of it. Toynbee tells of a man who used to let his fingernails grow very long and would hold them against the wall. He was very fond of music, and in this way could hear tone vibrations fairly well.

I have here the ordinary conversation tube. This is the oldest form of all. You will find it mentioned in all of the text books. That is a combination of the transmission and receiving system. You have this bell-shaped receiver and so get a larger volume of sound. This is an improvement on that made by Meyrowitz, with a microphone disc at the receiving end, who calls it the audiphone tube. One of the advantages of this is that you have no irritation of the external canal, and my patients tell me they suffer very much from anything that they have to keep in the ear. How much bone conduction there is in these cases I cannot tell, but there is some. Another improvement on this tube is simply the cutting out of the bell on two sides so that the speaker can bring it close to his mouth. That is a decided disadvantage. You get the best results in all the speaking tubes when you speak across them. When you speak directly into the tube the column of air is a solid body and, in motion, is pressed directly against the patient's drum. If you speak across the tube, all the patient gets is the vibration of the air. These tubes have the effect of bringing the mouth to the patient's ear—they can hear as far as the tube extends. There seems to be less actual vibration in the patient's ear with the microphone tube than with any conversation tube I have tried.

Then they went a step further on the same principle and Meyrowitz got out one that seems as if it would be just the right thing. He has combined the telephone receiver and transmitter in one instrument. As a matter of fact, it is not as good as the speaking tube. It is much smaller than the average speaking trumpet. There is not sufficient surface to act as a resonator at all. The microphone disc is all right, but if you compare these you wlil find that it is very defective. If we had some large resonator instead of the hard rubber, I think the results would be better. If you are going to have

as big a thing as that it would be just as well to have one that will make them hear.

This form has various names. It is generally known as Miss Green's phone. It is an excellent one. This resonator must not be too large. One of the important points is that the air wave should be reflected in such a way that the maximum of sound waves shall be sent into the tube. In this there is no reflection at all; the sound waves come right out again. This thing has, as you see, a very large surface, which acts as a resonator and vibrator with which the tones and all sounds that strike the hollow bell are reflected against the outer surface—which is cut open—and sent down the tube. It does the work, and if a thing of that sort were connected with a microphone it would be an exceedingly good instrument.

This is known as the telescope horn. It is very beautiful when closed, but rather formidable when open. Its action is that of a conversation tube, for while there is some resonance people have to hold it pretty close to get much result. It is rather a conversation tube than trumpet.

I spoke of those instruments which are introduced into the external meatus. This is known by a very beautiful title—the apparitor auris. What that means, I don't know. It has a small silver tube to extend into the depth of the ear. It is not pleasant to wear.

Here is an ear trumpet made in London (London Dome), in two or three sizes, and for its size this is an extremely efficient mechanical aid to hearing. It is very small, and can be held in the palm of the hand; it can be held up to the ear, and does not attract much attention. The only objection to it is the tip, which has to be put into the ear. If you will examine the interor of this instrument you will find that this tube is prolonged inside. You will find invariably that waves reflected from the periphery are sent into the opening of the tube. It is prolonged at this angle, and no matter what the ramifications of the tube on the outside, if you cut them open, you will find it is like that. The same principle is used in the improved trumpets.

I want to show you now the two principal electrical instruments on the market—the acousticon and the Mears aurophone. This is the ear phone made by Mears, and it has the advantage of great portability. It has a headpiece which can

be put over the head and held there; this is the telephone receiver, and here is the microphone receiver for the ear—and you can hear the little grains of carbon rolling around to make the contact. If you will examine this you will find that they have bands of metal to reduce the reverberation and cut down the size of the sound waves. The object of that is to cut down the amount of resonance. If a bell is struck on the rim, the whole bell will give one big tone; if you break up the volume of the air in some way by strips of metal, there will be very much less vibration of the walls—plenty of vibration of the air, but the vibration of the instrument will be reduced.

Here are two or three transmitting plates. This one is broken up into a number of small holes and there is very little vibration. In those that are wide open, the vibrations are comparatively large. That is the reason why when you listen to a sea shell you get the roaring noise—the whole shell vibrates. I think the microphone people have gone too far—the amount of air getting in is not sufficient—at least the tests I have made with this compared with the larger acousticon show that this is defective. At least that is my experience. The other one is built on the same principle. The idea of having a battery and sound receiver in one is a very good idea, but the advantage of this one lies in the sound receiver. It is quite large. This is for cases of what we call medium deafness, when the patient can hear a loud voice; they have others with four and five receivers, so that sound from any direction will produce the same effect. It is very possible that much sound will enter this, even if it is not directly in line. That is the advantage of this instrument, the reflection of sound waves inside—for you have a section through the top which holds the periphery; here there is a plate inside, and here are the carbon points of contact that rest against this metallic point which vibrates, and inside the receiver is like that; any sound that comes in is reflected up toward these little carbon contact points, where with the ordinary transmitter you have that, and only sounds that come directly to it are transmitted. No matter from what direction the sounds come in that they are reflected up to it.

I am sorry I have not had time to take a large series of cases and present figures, but it will be more interesting to have the experiences of some of the men who have had chronic cases.

XVIII.

PHYSIOLOGIC VESTIBULAR NYSTAGMUS.*

By J. R. Fletcher, M. D.,

Chicago.

Until very recently otologists in general have given but little attention to vestibular nystagmus. The observations of Purkinje, the researches of Flourens, Schmiedekam, Goltz, Baginsky, Högyes, Ewald, Mack, Breuer and Crum-Brown were known to but few, and interested the physiologist, neurologist and ophthalmologist chiefly.

In 1907, after three years of labor, Barany presented clinical vestibular nystagmus to the otologist.

Though it is true that the term nystagmus embraces not only rhythmic and undulating movements of the eyes, but also movements of the head or whole body, especially in lower animals, it is herein meant to refer to eye movements alone.

In order to avoid confusion, it is necessary to distinguish sharply between vestibular and ocular nystagmus.

Vestibular nystagmus is the nystagmus rhythmicus; ocular, the nystagmus undulans of Raehlmann.

CHARACTERISTICS.

Vestibular nystagmus is characterized by rhythmic movements of the eyes, of equal excursion, but of unequal velocity. It, therefore, has two components—quick in one direction and slow in the other. The nystagmus is increased if the eyes are directed toward the quick component, and decreased, or ceases entirely, when the eyes are directed toward the slow component.

This means that both the length of excursions and the velocity of the movements are respectively either increased or diminished when the person examined looks in the extreme

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lateral direction, toward the quick or slow component, without turning the head.

The nystagmus does not cease at once upon closing the eyes. It occurs in the planes of the canals, or is compound, that is, involving more than one plane; for instance, horizontal and rotary. Its plane depends upon the position of the head at the time of irritation.

Falling or other ataxic movements occur in the opposite direction to the quick component.

Not infrequent accompanying phenomena are vertigo, nausea and vomiting, especially when the nystagmus is rotary.

The direction of vestibular nystagmus is designated by the quick component.

Ocular nystagmus is characterized by undulating movements of the eyes, of equal excursion and velocity, and cannot, therefore, be said to have any special direction. It is not increased when the eyes are in either extreme lateral position. On the contrary, it ceases when fixation of vision in any direction is possible. It ceases when the eyes are closed. It can be produced in any plane.

Its plane changes with an alteration of the relative position of the head to the moving object (objects) which the eyes attempt to follow. For example, a cylinder upon which have been placed alternate black and white stripes, revolving around the vertical axis, will cause a horizontal ocular nystagmus when watched while the head is erect. If the cylinder is revolved around the horizontal axis, or if the cylinder is kept in the vertical position and the person watching its revolutions lies down, the plane of the nystagmus will change to the vertical (toward the forehead).

Physiologic ocular nystagmus is never compound or rotary.

Physiologic vestibular nystagmus can be produced:

(a) By turning the body, either in the upright or recumbent position, around the vertical axis (nystagmus by turning).

(b) By the application of heat or cold to the tympanic cavity (caloric nystagmus).

(c) By the galvanic current (galvanic nystagmus).

Spontaneous vestibular nystagmus sometimes occurs in perfectly healthy persons, but only when the eyes are in the ex-

treme lateral position. Its excursions are very short, but increase if the position of the eyes is maintained. Its quick component is always directed toward the side to which the person looks. If the head is erect, the plane of the nystagmus will be horizontal, rotary, or both combined.

EXPERIMENTAL NYSTAGMUS.

Flourens found that by opening any of the semicircular canals, nystagmus occurred in the plane of the canal thus irritated. He, therefore, deduced the law that each canal produces nystagmus in its own plane. He came very near the whole truth when he stated that these canals exert a restraining or controlling influence upon the body movements.

Goltz confirmed the findings of Flourens and first declared the semicircular canals to be organs governing equilibrium.

The following has been taken from among the experiments of Ewald to demonstrate certain points:

He uncovered the right horizontal membranous canal of a pigeon, at the arch, and inserted a compression plug so that the endolymph could not flow by it. He then drilled another hole between the first and the ampulla. Over this opening he made fast a cylinder and piston, to which was attached a hand bulb of rubber. When the bulb was pressed the piston was thrust against the membranous canal, causing the endolymph to flow in the direction from the ampulla to the utriculus. This resulted in a slow movement of the eyes to the left. When the piston was aspirated the endolymph flowed from the utriculus to the ampulla, causing a slow movement of the eyes to the right or toward the side experimented upon. This experiment showed:

1. That movement of the endolymph is the primary act.
2. That the slow component comes from the vestibular apparatus.
3. Its direction is governed by the direction of the flow of endolymph.

Upon these facts, the form of the ampulla and end organ of the vestibular nerve in the ampulla, the crista ampullaris, and the connection of both vestibuli through their nerves with Deiter's nucleus and the eye muscle centers, together with the

voluntary eye movement control from the brain cortex, is based the theory of vestibular nystagmus, which is as follows:

THEORY.

The endolymph contained in the membranous canal and utriculus flows through the ampulla, over the crista ampullaris. It moves the cupula which caps the epithelial hairs of the cells of the crista in the direction of its current. (Fig. 1.) This motion makes tension upon the hairs, causing a sensation which is transmitted by the vestibular nerve to Deiter's nucleus, thence through direct and crossed fibers to the oculomotor, abducens and trochlearis centers, through their nerves to the extrinsic eye muscles. This accounts for the slow component of the nystagmus, the reflex eye response to vestibular irritation. The quick component, bringing into action the opposite group of eye muscles, must arise elsewhere. Ewald maintained that the quick component is of extralabyrinthine origin, and that it is a movement of recovery. Barany thinks likewise, and believes it originates in the gyrus angularis, as fibers from there are known to communicate with the eye muscle centers through Monakow's (?) cells. Add to this the well-known synergetic action of the eyes, and we have facts enough to make the understanding of reflex eye movements from the stimulation of one vestibular apparatus quite easy. The canals work, however, in pairs, never singly, as will be seen in the consideration of nystagmus by turning. Their action in turning must be simply intensification of the normal physiologic. The action of both canals at the same time (Fig. 1) is a stumbling block in the way of easy understanding of the phenomena of nystagmus. To simplify it, I have evolved a

THEORY OF SYNCHRONISM.

In the evolution of this theory I have become convinced that the cristæ of both canals of a pair act together simultaneously, and never under normal physiologic conditions, in such manner as to antagonize each other. As there are but two directions in which the cupula can move in the ampulla, away from or toward the utriculus, it must follow that there is a position of greatest and one of least physiologic activity and a position of rest. (Figs. 1 and 3.) When the cupula

has moved as far as it can in one or the other direction, it is in the position of greatest or least physiologic activity, and its fellow in the opposite canal takes the opposite position.

The direction of greatest or least physiologic activity means motion toward one or the other active positions. The cristæ of the pairs of canals are in close communication through Deiter's nucleus, and each is notified immediately of any action of its fellow. The crista which is stimulated by the movement of its cupula in the direction of greatest physiologic activity dominates and determines the direction of the slow or vestibular component of the nystagmus. The cupola of the opposite crista moves in the unantagonistic direction. It is stimulated in the direction of least physiologic activity, thus giving notice of harmony to the dominant crista and to the auxiliary senses which maintain the equilibrium. (Fig. 1.)

The dominant canal is not necessarily the one primarily stimulated, because if the stimulation is such as to cause the cupula to move in the direction of least physiologic activity, then its fellow of the other canal of the pair synchronously moves in the direction of greatest activity. Of course, the one moving in the most active direction dominates and determines the direction of the nystagmus. Figure 1 shows the cristæ of both horizontal canals in active positions. These positions are in accord with Ewald's experiments. My own opinion, based upon the phenomena of nystagmus by turning and of caloric nystagmus, leans toward the reversal of the directions of activity. Their positions are correct in nystagmus by turning, but the question is, which sends out the strongest impulse?

Ewald assumed that the canal primarily stimulated dominates, and overlooked the fact that both of a pair work synchronously. This, I think, is the common error. Just what physical mechanism causes the flow of endolymph to take place in the unstimulated canal (see caloric nystagmus), I am not in a position to say. There are several possibilities. This much may be said with reasonable certainty: When one crista of a pair is set into activity by any stimulus whatsoever, the tonus of the other, through their nervous mechanism, is so changed that it becomes active also.

Physiologic nystagmus, with its associated symptoms, is an expression of overstimulation of the vestibular apparatus.

PLANES OF ACTIVITY.

Flourens found that the horizontal is the typical functionating plane. Therefore, when the head is erect, the horizontal pair of canals functionate. When the head is inclined ninety degrees forward or backward, the anterior vertical pair functionate. When the head is inclined ninety degrees toward the shoulder, the posterior vertical pair functionate. In intermediate positions of the head, two pairs of canals may functionate at the same time, producing the following effect reduced to a law:

When two pairs of canals functionate at the same time beyond their normal physiologic activity, the reflex result of their combined action is compound nystagmus. That is, nystagmus in the planes of both pairs of canals.

NYSTAGMUS BY TURNING.

(Horizontal Nystagmus.)

If a perfectly healthy person seated in a revolving chair (preferably without a screw) is turned a few times, vestibular nystagmus will occur.

The nystagmus will be in the direction of turning during turning (primary nystagmus). (Fig. 1.) Upon sudden cessation of turning, the nystagmus changes to the opposite side, or in the opposite direction to the turning (after nystagmus). (Fig. 3.) In a few cases, after thirty to forty seconds, it changes again, for a very brief time, in the direction of turning (so-called after-after nystagmus, better called ultimate nystagmus).

With the head erect during turning, the horizontal pair of canals will be in the horizontal or functionating plane. Their ampullæ are at the ends of their lateral or outer arms, and open into the utriculi. They may be likened to two horseshoe-shaped tubes, placed side by side on a table, the open part of the horseshoe pointing away from the observer. (Fig. 1.) The outer or lateral end of each tube is much enlarged, the ampulla; both ends of each open into a sack, the utriculus. The tubes and sacks are filled with a fluid, the endolymph. If these tubes and sacks are revolved to the right, in the direction of motion of the hands of a watch held face upward,

the large mouth of the right tube moves away from the endolymph in the sack, causing the flow of fluid to be from the enlargement to the sack, or from the ampulla to the utriculus, the direction of least physiologic activity. The large mouth of the left tube moves toward the endolymph in the sack, causing the flow to be from the sack to the enlargement, or from the utriculus to the ampulla, the direction of greatest physiologic activity for this pair of canals.

As the hairs of the crista ampullaris are bent in the direction of the current, like grass in a stream of water, it must follow that the slow component of the nystagmus is directed to the side from which the strongest sensation emanates, the side upon which the endolymph flows into the open mouth of the ampulla, or to the left during turning to the right.

The quick component of the nystagmus, governed by the cortex, is directed to the right, or in the direction of turning. As the direction of the nystagmus is designated by the quick or most easily seen component, this nystagmus is said to be in the direction of turning during turning. The dominant canal is the one in which the cupula has moved in the direction of greatest physiologic activity, irrespective of the source of irritation. Barany compares the movement of endolymph to one standing in a car. When the car first moves, one falls backward. In a few moments both car and passenger move together, at the same velocity. When the car suddenly stops, one plunges forward in the direction in which the car is moving. So it is with the endolymph. For example, in turning to the right, after a slight movement in the opposite direction to the turning, the endolymph is carried with the turning and at the same velocity. When the turning suddenly stops, the endolymph rushes on in the direction of turning, for a moment, into the mouth of the right ampulla, or from the utriculus to the ampulla, the direction of greatest physiologic activity, and from the left ampulla to the utriculus, the direction of least physiologic activity. The result is nystagmus to the right during turning. The left crista exerts the strongest influence, and the vestibular component is to the left. After turning, there is immediate reversal of direction of the nystagmus opposite the direction of turning. The right crista now dominates. The slow component is to the right, the quick to the left, constituting nystagmus to the left.

The duration of horizontal nystagmus is, on the average, forty-one seconds to the right and thirty-nine to the left, after ten turnings.

ROTARY NYSTAGMUS.

We must now consider the anterior vertical pair of canals. The facts which follow will further emphasize Flourens' law that each canal produces nystagmus in its own plane, that is, in the plane in which it normally rests when the head is erect.

Let us consider the horseshoe-shaped tubes lifted so that the open ends point downward. (Fig. 1.) The ampullæ open into the utriculi from above downward, or in the vertical plane. (Fig. 2.) In this position turning has no influence upon them. With the head inclined ninety degrees forward the ampullæ of the anterior vertical canals open into the utriculi in the horizontal or functionating plane from before backward—just the reverse direction to the opening of the horizontal pair. In turning to the right while in this position the endolymph flows from the utriculus through the right ampulla, the direction of least physiologic activity; through the left ampulla to the utriculus, the direction of greatest physiologic activity, exactly the reverse of the horizontal canals. The slow component of the nystagmus is directed to the left. The plane of the nystagmus, with relation to the head, is not horizontal, but frontal, that is, rotary. It is directed to the right during turning, and to the left after turning. With the head inclined ninety degrees backward, the ampullæ of the anterior vertical canals open forward into the utriculi, in exactly the same direction as do the horizontal pair with the head erect. The direction of the nystagmus caused by turning to the right is, however, just the reverse to the horizontal, both during and after turning. It is in the normal plane of its canal, therefore rotary. This is further evidence of the direction in which the cupula must move to cause the greatest tension on the hair-like epithelial prolongations of the crista ampullaris and thus produce the governing sensation.

VERTICAL NYSTAGMUS.

The posterior vertical pair are almost in the sagittal plane. Their ampullæ enter the utriculus about midway between the horizontal and vertical planes. The nystagmus which results

from turning when they are placed in the horizontal plane by inclining the head to the shoulder ninety degrees is vertical. It is directed toward the forehead, or in the direction of turning during turning, and toward the chin or in the opposite direction to the turning after turning.

CALORIC NYSTAGMUS.

Many otologists have noticed that when irrigating the ear with too warm or too cold water, their patients have vertigo, which is a symptom commonly associated with rotary nystagmus. Most notable among them are Schmiedekam, as far back as 1868, Baginsky (whose conclusions were incorrect) and Urbantschitch. Cohn observed vertigo and nystagmus in 1891, and although acquainted with all the theories of this vertigo, expressed the opinion that the phenomena emanated from the semicircular canals. He, however, failed further to follow up this interesting subject. To Barany alone belongs the honor of systematically investigating the influence of water of various temperatures upon the action of the vestibular apparatus; the discovery of many new and important facts, and the application of them to the diagnosis of labyrinthine and intracranial disease. He teaches the following:

When the ear is irrigated with water, warmer or colder than the body temperature, a definite nystagmus occurs. Water of the body temperature causes no reaction.

When one ear is irrigated with warm water, rotary nystagmus takes place toward the irrigated side. When cold water is used, the nystagmus is directed to the opposite side, that is, the quick component is away from the irrigated ear. Its character is compound (rotary and horizontal). These reactions are constant, no matter whether the ear drum is punctured or not. So long as the labyrinth is not completely destroyed, the reaction takes place, and is of special clinical significance for this reason. When both ears are sprayed with water of the same temperature, either warmer or colder than the body temperature, nystagmus occurs to both sides. By looking in the extreme left lateral direction, the quick component of the nystagmus will be directed to the left. By looking in the extreme right lateral direction the quick component will be toward the right. It is much stronger than the

spontaneous physiologic nystagmus. There is no nystagmus upon fixation of vision straight ahead.

If the right ear is irrigated with cold water and the head placed at an angle of 180 degrees to the upright position, so that the vertex of the head is toward the floor, rotary nystagmus occurs to the right, or in the same direction as when warm water is used and the head kept in the upright position. The endolymph flows from the utriculus to the ampulla (the direction of least physiologic activity, allowing the left canal to govern the slow component and indirectly the direction of the nystagmus).

Barany's theory is as follows: "We may compare the labyrinth to a vessel filled with fluid of 98.6° F., the outer wall of which is syringed with cold water. The fluid next to the syringed wall is cooled and sinks to the deepest part of the vessel, and in its place flows water of the body temperature. Thereby a circulation in the vessel is set up. This motion is certainly very small, considering the dimensions of the canals. It is clear that syringing with hot water produces a current in the fluid exactly opposite to that produced by syringing with cold water."

If this theory is correct, my theory of synchronism is further substantiated, for the reason that by the use of cold water horizontal and rotary nystagmus take place to the side opposite the irrigated one, while heat produces the opposite reaction. If the cooler fluid sinks, it must flow from the ampulla to the utriculus, the direction of greatest physiologic activity, in the anterior vertical canal, as its summit is the highest point of the vestibular apparatus. It flows from the utriculus to the ampulla in the horizontal, because its arch is exposed in the antrum to thermic influences and is lower than the ampulla. (Fig. 2.) This flow is also in the direction of greatest physiologic activity for the horizontal canal. This nystagmus is equivalent to the after-nystagmus by turning to the right, with the head inclined 45 degrees forward during turning. If we consider the right side to have been irrigated, the quick component must be directed to the left and the slow to the physiologically most active side, the right. The nystagmus must be compound and it is so. The endolymph movement is reversed when hot water is used—that is, it rises to the highest point, which is the summit of the arch of the anterior vertical

canal. This produces a rotary nystagmus to the irrigated side —that is, the quick component, of cortical origin, is so directed. The slow or vestibular movement is directed toward the unirrigated side, as its cupula has moved in the direction of greatest physiologic activity, and overbalances the action of the crista of the irrigated side.

When the head is inclined 90 degrees toward the right shoulder, after the right ear has been irrigated with cold water, horizontal nystagmus to the right is produced, as the indifferent end of the horizontal canal is the highest point and its ampulla rests against the lateral labyrinth wall. The endolymph flows from the ampulla to the utriculus, the direction of least physiologic activity. Incline the head to the left shoulder and the nystagmus will be directed to the left—as the right ampulla is then the high point, causing the endolymph flow to be from the utriculus through the ampulla, the direction of greatest physiologic activity. Warm water produces the opposite effect in these positions. The posterior vertical pair seem to be uninfluenced by the application of heat or cold to the lateral wall of the labyrinth. They are so deeply situated and the others so exposed that the nystagmus becomes severe enough to cause the experimenter to stop before the posterior vertical pair show any signs of disturbance.

COMPOUND NYSTAGMUS.

This form of nystagmus is the result of more than one pair of canals functionating more forcibly than normal physiologically at the same time. It occurs in turning with the head in an intermediate position between the erect and 90 degrees forward, etc. In such case the nystagmus is horizontal and rotary, or diagonal, viz., compound.

ATAXIA.

(Reactionary Movements.)

Barany has formulated the following law with relation to reactionary movements of the body during nystagmus: "The movements of the body take place in the plane of the nystagmus, and their direction is opposite to the quick movement of the nystagmus."

It is not constant in all persons.

Its relation to the severity of the nystagmus differs in different persons.

Sometimes falling takes place easily when the nystagmus is slight. In another case it may not occur at all when the nystagmus is very strong.

It does not occur in horizontal nystagmus.

"Frequently with open, as a rule, with closed, eyes, the sensation of falling occurs to the right in right rotary nystagmus. With the eyes closed and turned in the direction of the quick movement (to the right), the sensation of falling is increased; with the eyes turned in the direction of the slow movement, a lessening or cessation of same." (Barany.)

Although the sensation of falling is to the right, these persons actually fall to the left.

In right rotary nystagmus, when standing erect, with the feet together and eyes closed, the falling is in the frontal plane to the left. If the head is rotated to the left shoulder, the falling is forward. If rotated to the right shoulder, the falling is backward, as the quick component is toward the front. If the head is inclined 90 degrees toward the chest, no falling occurs, but rotation of the whole body takes place to the left. The nystagmus is rotary and actually in the horizontal plane. Falling in this plane is impossible.

Many persons experience the sensation of falling only when the senses which are auxiliary to the vestibular apparatus in the maintenance of equilibrium, namely, sight and the muscular sense, are at rest; that is, in the sitting or recumbent posture, with the eyes closed.

Ataxia can be considered of vestibular origin only when the falling is in the opposite direction to the quick component of the nystagmus, and when change of the position of the head causes a change in the direction of the reactionary body movements.

Other associated symptoms of vestibular nystagmus are:

1. *Movement of Neighboring Objects.*—In some persons this movement is continuously to the side of the quick component; in others to the side of the slow component. In another group the motion is from side to side. And, last, there are those who see no movement. In the first group an optical impression is made by the quick component only. In the second, by the slow component only. In the third, by both com-

ponents. In the fourth, by neither. In the first three groups the seeming movements are increased by looking to the side of the quick component and lessened by looking toward the slow component.

2. Frequently there is darkening of the field of vision, or colors or dark spots appear before the eyes.
3. Pallor or flushing.
4. Perspiring.
5. Palpitation, or slowing of the pulse.
6. Trembling.
7. Quickening and deepening of respirations.
8. Partial or complete loss of consciousness.

These accompanying symptoms, second to eighth inclusive, occur in persons of unstable nervous system, and chiefly during rotary or vertical nystagmus.

In consequence of their occurrence in neurasthenics, consideration of these symptoms does not strictly belong in a paper upon physiologic nystagmus, but are inserted to cause close observation and to prevent error. (From my notes of Barany's lectures.)

GALVANIC NYSTAGMUS.

When the cathode or negative pole of a galvanic current is applied just before or behind one ear and the anode or positive pole is placed upon some remote spot of the same side, twenty to twenty-five milliamperes, will produce a nystagmus to the side thus irrigated. That is, if the cathode is placed on the right ear, the quick component of the nystagmus is to the right. The slow or vestibular component is directed to the left. When the anode is placed on the right ear, the nystagmus is directed to the left. It will be seen that the cathelectrotonus produces rotary nystagmus equivalent to the primary by turning and to the caloric by heat.

Anelectrotonus equals rotary after-nystagmus by turning and the caloric which cold produces.

"Galvanic nystagmus is most plainly seen when the eyes are in the extreme lateral position. Earlier authors have neglected this and have fallen into error when they have thought vertigo and disturbance of equilibrium to be the first phenomena which appear. When the lateral position of the eyes

is chosen, we always observe nystagmus to be the first phenomenon." (Barany.)

The accompanying symptoms of rotary nystagmus from galvanism are the same as in rotary nystagmus from other causes.

SUMMARY.

Nystagmus may be divided into two chief types: *Vestibular* and *ocular*. The main distinguishing characteristics are:

Vestibular.	*Ocular.*
Rhythmic eye movements, of equal excursion, but unequal velocity.	Undulating eye movements, of equal excursion and velocity.
Has, therefore, two components, quick in one direction, slow in the other.	No quick component.
Nystagmus increased when gaze is in the direction of quick component. Decreased or stopped when gaze is to the side of slow component.	Not increased, but ceases with fixation of vision in any direction.
Does not cease upon closing eyes.	Ceases when eyes are closed.
Each pair of canals produce nystagmus in their own plane.	Plane governed by relative position of head to objects looked at.
It is either horizontal, rotary, vertical, or compound.	Never compound or rotary.
Produced by revolving the body, by heat and cold to the labyrinth wall and by galvanism.	Produced by moving objects before the eyes.

It has been shown by experimental nystagmus that the semicircular canals produce nystagmus in their own planes. That the flow of endolymph is the actuating influence upon the crista ampullaris, and that the direction of this flow governs the direction of the nystagmus. That the vestibular apparatus is the chief organ of equilibrium.

A few persons show a spontaneous vestibular nystagmus, which is characterized by appearing when the gaze is directed toward the external canthus of either side, and is increased if this position of the eyes is maintained.

THEORY.

The slow or vestibular component of the nystagmus arises in the end organ of the vestibular nerve and is transmitted to its own and the eye muscle centers, thence to the eyes. The quick component is cortical, from the gyrus angularis—and is a movement of recovery.

SYNCHRONIC THEORY.

It is impossible for me to conceive that one canal of a pair functionates while its companion is at rest, because in the experimental production of nystagmus by turning, both must be actuated at the same time by the flow of their endolymph. This flow is in opposite directions in the opposite ampullæ, and, therefore, moves the cupula toward the utriculus on one side and away from it on the other, at the same moment. There must be a direction of greatest and one of least physiologic activity. That canal governs in which the movement is in the direction of greatest physiologic activity, irrespective of which canal of a pair has been stimulated. There is, of course, a position of rest, which is assumed in both canals at the same time, when neither is functionating. I have shown the direction of greatest activity in the horizontal pair to be away from the utriculus —and in the anterior vertical pair, toward it. The action in the posterior vertical pair has been insufficiently studied, as they are difficult to actuate either by thermic influences or galvanism. The statements which have been made concerning them in this paper are statements of fact only. It is more than probable, however, that the principles governing their action are identical with those governing the other two

pairs, modified only by their anatomic position and the positions of their cristæ in the ampullæ.

Nystagmus by turning has three stages: Primary, during turning; after nystagmus, when turning ceases; ultimate nystagmus, which sometimes follows after-nystagmus.

Nystagmus during turning is in the direction of turning, as a rule.

After nystagmus is in the opposite direction to turning, the only exception being when the head is inclined 90 degrees backward. It is either horizontal, rotary, vertical or compound, depending upon the position of the head during turning. The average duration after ten turnings is 41 seconds to the right and 39 to the left for horizontal; 24 to the right and 29 to the left for rotary nystagmus.

CALORIC NYSTAGMUS.

Is produced by the application of heat or cold to the tympanic cavity.

Cold produces nystagmus to the opposite side.

Heat produces nystagmus to the heated side.

The plane of nystagmus from cold is compound, horizontal and rotary. That from heat is rotary.

Temperature applied which is the same as the body temperature produces no reaction. When a temperature higher or lower than that of the body is applied to both ears at the same time, nystagmus occurs to either side by looking in the extreme lateral direction, but differs from the normal spontaneous by being more severe. It decreases with time. It ceases immediately upon fixation of vision straight ahead.

The accompanying symptoms are vertigo, nausea and vomiting, especially of rotary nystagmus.

Seeming movements of near-by objects, varying in direction with different individuals, and seeming movement of the body are quite different.

VESTIBULAR ATAXIA.

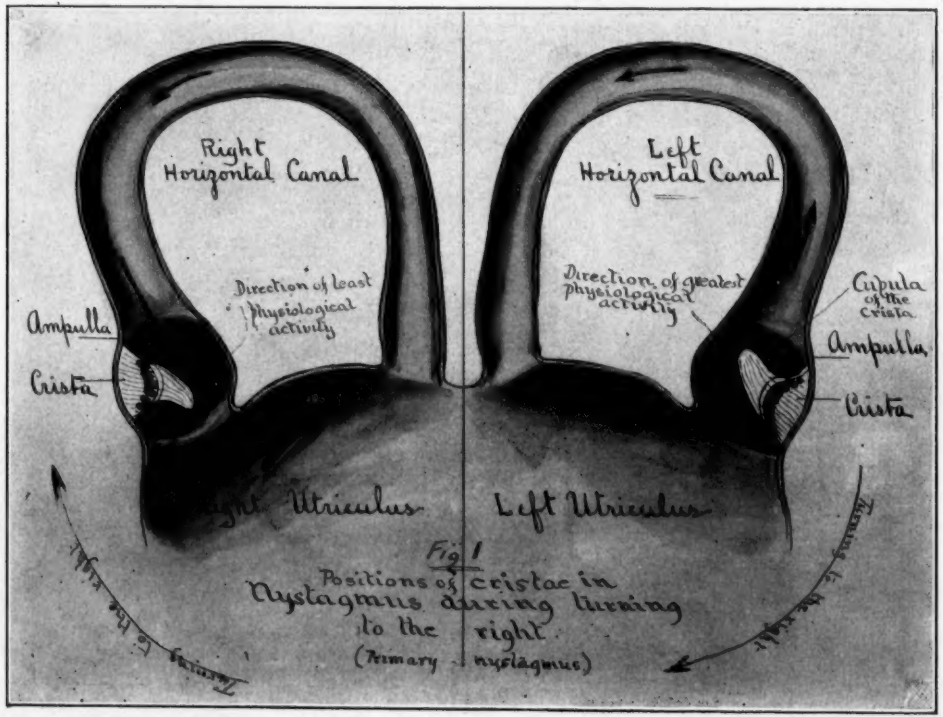
Reactionary movements of the body of an ataxic chaarcter can usually be elicited. This falling or reactionary movement is always in the opposite direction to the quick component of the nystagmus, in persons of stable nervous system. When

this rule is violated, the person is neurasthenic or has other graver nervous lesion interfering with correct physiologic activity. It bears no relation to the intensity of the nystagmus artificially produced.

GALVANIC NYSTAGMUS.

Two to four milliamperes will produce nystagmus if one electrode is placed on the right and the other on the left tragus or mastoid. When one electrode is placed before the ear and the other held in the hand, 24 milliamperes will be required. Cathelectrotonus produces the same nystagmus as heat; anelectrotonus, the same as cold in caloric nystagmus.

The nystagmus is most plainly seen when the gaze is directed toward the extreme lateral position.


Right Horizontal Canal
Left Horizontal Canal
Direction of least physiological activity
Direction of greatest physiological activity
Ampulla
Cupula of the Cristæ
Ampulla
Cristæ
Cristæ
Right Utriculus
Left Utriculus
Fig 1
Positions of cristae in Nystagmus during turning to the right.
(Primary nystagmus)

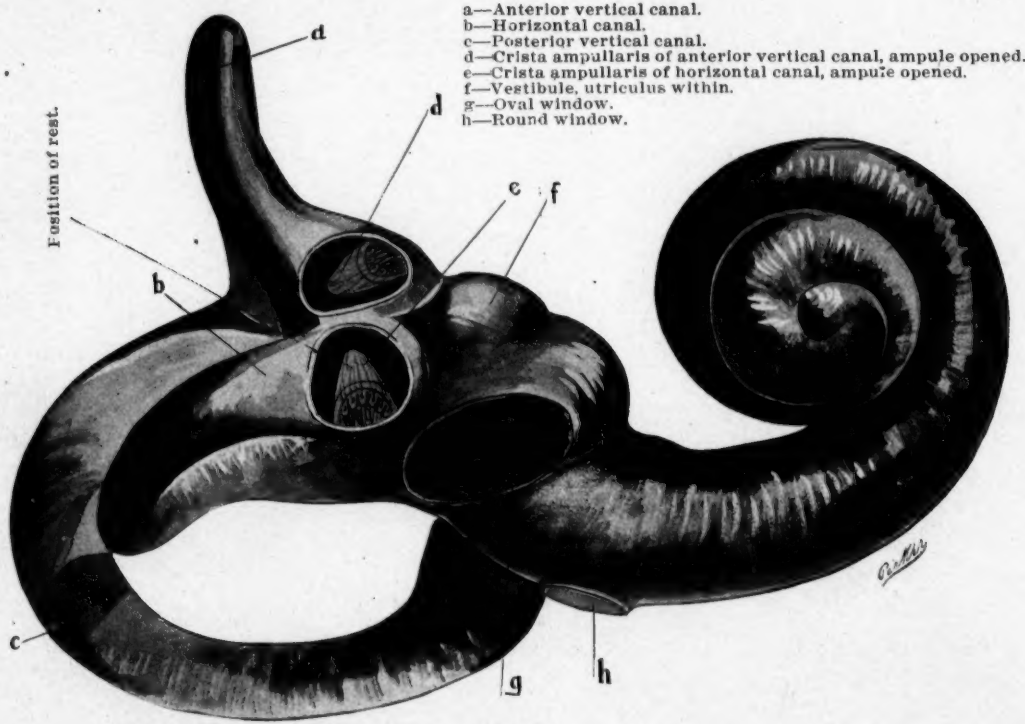


Fig. 2.
Semi-Diagrammatic.

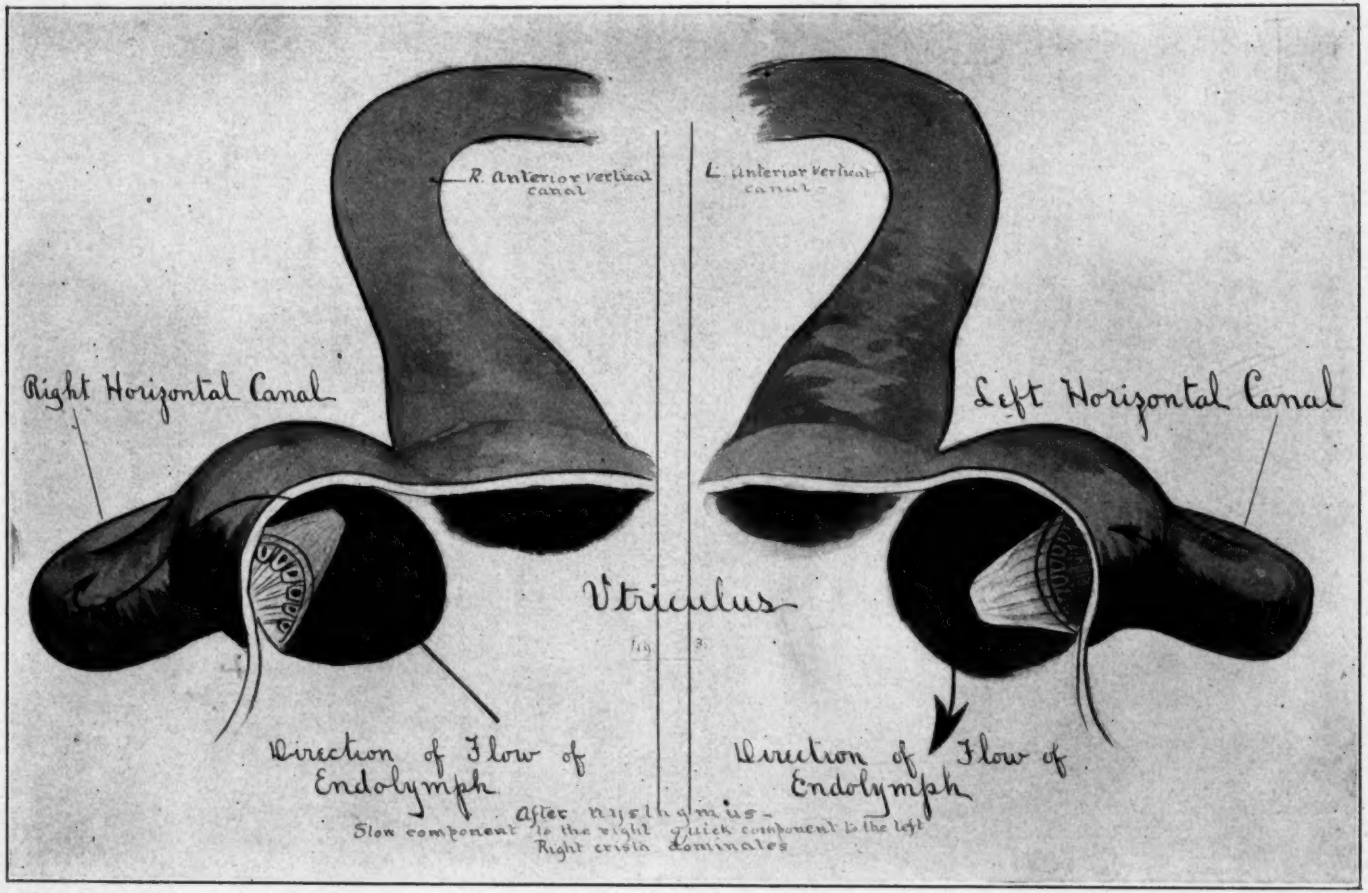


fig 3.

after Neyelhamius -

Slow component to the right quick component to the left

Right crista dominates

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XIX.

PRELIMINARY REPORT OF THE IMPROVED TECHNIC OF THE THIERSCH GRAFT FOLLOWING THE RADICAL MASTOID OPERATION.*

By Cullen F. Welty, M. D.,

San Francisco

In a preliminary report of the improved technic of the Thiersch graft following the radical mastoid operation, it is very essential that the operation be done in a very thorough manner.

Every individual cell is destroyed until hard bone is encountered, or the dura, sinus or nerve uncovered. This final destruction of cancellous bone is best accomplished with a hand burr. It may be done with a burr driven by electricity; however, I prefer such burr for the bone of greater density. It is very essential that all the uneven surfaces be made perpectly smooth.

The outer part of the bony meatus must be removed sufficiently to be on a horizontal plane with the floor of the tympanic cavity. The posterior bony wall must be cut down to the floor of the newly made bony meatus. By this procedure more room is gained and the pocket which was formed by the tympanic cavity has been eliminated. In the removal of the posterior bony meatus and facial spur, great care must be exercised in not injuring the facial nerve. This is best overcome by chiselling the wall away with large chisels and working parallel to the nerve, so that in the event that the nerve is uncovered, it would not be cut. This particular point will enable the operator to remove more bone than any other, with more safety to the facial—in fact the facial cannot be cut by an experienced operator.

The mucous membrane of the tympanic cavity must be

*Read before the meeting of the San Francisco County Medical Society, October 11, 1910.

entirely removed. I literally mean that after a very thorough inspection, none can be detected. At this place it will be necessary in most cases to use a hemostatic agent of some kind, as hot saline solution, peroxid of hydrogen or adrenalin.

Most careful attention must be directed to the tube in order to remove the mucous membrane thoroughly.

The tympanic wall should be so thoroughly removed by chisel and made smooth by burrs, that the small searchers of Jansen's will not be arrested.

Everything that has been said so far is absolutely important in every radical operation. However, it is much more important when Thiersch grafts are to be applied, as any infection that may remain in the bone will ultimately destroy the graft and the purpose will fail of accomplishment.

The Neumann plastic should be made in preference to all others for this particular procedure, the upper and lower flap sutured in place, and the point of the V sutured to the auricle. The sutures to be used in holding the V part of the plastic should be catgut. The sutures for the upper and lower flap are best of catgut; if not, they must be removed when the skin-graft is applied.

The use of other sutures, if allowed to remain, may or may not cause trouble in the after treatment of the case.

The toilet of the operation having been completed, the patient is put to bed and is encouraged to go about as soon as possible. Four days following the radical ear operation, the Thiersch grafts are applied, this particular time being selected because the granulations are comparatively small; in some cases they are quite large. I have used the grafts earlier, but of late I have selected the fourth day as the best for all cases. In the near future I am going to use this same procedure in detail at my first operation. On the fourth day, patient being anesthetized, the operative field is cleaned in the usual way. The whole cavity will be found covered with granulations, all of which must be most carefully removed, special attention being directed to the tube. At this time I use hot saline solution as a hemostatic agent, inspecting the cavity from time to time; finally to reassure myself, I use peroxid of hydrogen several times. When I am satisfied beyond a question of doubt that everything is away, I put in gauze saturated with adrenalin; this gauze is held in the cavity

under pressure by an assistant while the grafts are being prepared. At the time I begin my preparation of the ear, the nurses are preparing the leg or part from which the grafts are to be taken. In this preparation, bichlorid has never been used. Sterile salt solution is used in excess, following all the other aseptic procedures.

I try to get about three or four grafts one-half inch wide by one and one-half inches long. Some smaller ones one-fourth inch by one-half inch. Some of the grafts may be lost in preparation or in applying them.

The grafts are taken from the razor directly to the Jansen spatula, and after all edges are straightened they are put aside for use. When grafts are in readiness, the adrenalin tampon is removed from the ear. The cavity will be found to be absolutely dry, and if not, more adrenalin must be used; the cavity must be free from oozing blood or the grafts will not adhere.

The first one is fastened with a searcher into the tube, bringing it out over the floor of the tympanic cavity posteriorly. The second, superior to the first, brought back over facial into mastoid cavity. The third usually covers the remaining wall of the attic and antrum. The three that have been used are the larger ones. The uncovered areas that are now left are covered by the remaining grafts, the one being selected that will cover the denuded area best. Small pledgets of cotton are now used to fix the grafts,—they must be so small that they do not touch either surface while being put in place. The first one is put over the tube; the second firmly applied to the posterior inferior quadrant, the next over the stapes, and so on until all the grafts are held well in place so they will not be materially disturbed when a dry tampon is introduced. The size of this tampon will correspond to a piece of gauze four or six inches square. After the dry gauze, a similar piece of gauze is saturated with oil of vaselin, and packed within the mastoid cavity; after this a similar piece, in size larger or smaller as the occasion may demand, to fill the entire cavity made by the operation.

The posterior wound is now closed in the usual manner. It will be found that an additional tampon by way of the meatus will assist materially in holding the plastic in the way intended, resulting in a very large meatus, with cut surfaces

all within the ear. This materially adds to the comfort of the patient as well as preventing a contracted meatus. The outside dressing is as usual. The ear tampons are removed on the fourth day. If there is any difficulty or pain in the removal of the tampons, contrary to the ordinary teachings, peroxid of hydrogen may be used in excess to soften and loosen the tampons, and stop the bleeding, so that the small cotton fasteners that are put in to hold the grafts in place may be seen and taken away.

In 50 per cent of the cases a white cavity will be seen; in fact this is always the case when time is taken to stop the bleeding that comes from the inner surface of the soft parts that have been sutured and could not be covered by graft. This is the improved technic of the Thiersch graft in the radical ear operation.

In fact a graft never adheres to the tampons so as to be torn from its attachments. I say attachments, because I purposely pulled one away for experimental purposes; it was so firmly attached that the ordinary Politzer ear forceps would slip off. I was compelled to use an anatomic forceps and hold with considerable strength in order to pull the graft away.

In some of the cases the outer layer of epidermis would loosen; this occurs in ten days or two weeks after the grafts have been applied; they always leave a delicate epidermis that hardens in a very short time. I hardly know how to account for the fact that in some cases the entire graft remains in place while in others the outer layer comes away. The only explanation that I can offer is that in some instances the graft is too thick. However, this does not seem to be serious, as the cases heal in about the same time. Occasionally it will happen that granulation tissue makes its appearance when the edges of the graft are not in perfect apposition. They are very easily destroyed with the ring knife. At the following dressing the denuded area will be found completely dermatized.

Occasionally excessive granulation tissue makes its appearance posteriorly in the region of the plastic. This is removed with curette and packed tight with gauze saturated with sterile oil of vaselin. Contrary to the teaching of today, bichlorid of mercury is used to irrigate the cavity. This is

necessary where there is an unusual amount of pus or odor from secretion. In other instances where there is more debris than there should be, I always irrigate with the intratympanic canula and under inspection, so that the force of the stream is directed to the particular spot that requires attention. I also irrigate with normal salt solution and boracic acid.

As has been said before, the oil dressing is removed in four days or sooner if necessary. In two days a second dressing is made which includes an irrigation of bichlorid of mercury 1-3000, and from this time on it is dressed daily until complete recovery.

It is necessary to use the bichlorid irrigation at the second dressing to remove disagreeable odor that is caused by the oil of vaselin becoming rancid. This happened in all my cases, however, and I did not care to make a change until this report had been made. In a case operated upon a few days ago, I used ½ per cent solution of carbolic acid in paraffin oil, U. S. P., and to my surprise, there was no odor; besides, the mastoid cavity was in better condition than in any of my previously operated cases. In fact the case is so near well in two weeks, that it is difficult to find uncovered areas. I believe this antiseptic added to the oil will further materially improve the technic. This case is not included in those reported.

PREPARATION OF OIL.

I had recently made for me a 10 cc. ampoule of ½ per cent solution of carbolic acid in paraffin oil, U. S. P., or hydrocarbon oil; to be heated one-half hour at 150°C—and repeat the same procedure in twenty-four hours.

This has yielded better results than the plain Cheseborough oil of vaselin that has simply been sterilized.

The final procedure of every dressing is a thorough drying of the ear. Pulverized acid boracic is blown into the ear and then use is made of single small pieces of gauze one-half inch square with a small roll of gauze to fit snugly into the outer meatus. As a rule the bandage is left off ten to twelve days following the original operation.

In several of the cases vertigo was complained of for some time. In three instances it has continued after the ear was entirely dry. The only explanation that I can offer is that of a

circumscribed labyrinthitis that has not entirely recovered—there remains a hyperemia of the bony canal, or that the canal is simply covered by epidermis, and is more or less influenced by the atmospheric temperature. However, to offset this latter, I have packed the meatus and it did not seem to have any influence. Another reason that had occurred to me, that of pressure on the stapes of the graft.

The only cases that were excluded from this series of 21 cases, were one of labyrinth suppuration and two in which the dura was so diseased that it would not have been safe to use a skin-graft.

Case 107—hearing not improved. Can offer no explanation. In my history card she is marked lengthened Schwabach.

Case 119—hearing made worse. This case had an acute serous labyrinthitis which subsided; two weeks later had a similar attack.

Case 121-122—hearing made worse. Can offer no other explanation than an impaired cochlea as was shown by the Schwabach test. This patient had a circumscribed labyrinthitis as well. This is also one of the patients who has more or less vertigo and tinnitus. This is disappearing and I believe in a comparatively short time will be entirely gone.

Case 123—Perfect result but I have no way of measuring the hearing.

The eighteen cases show a remarkably rapid recovery; 4 cured in three weeks, 10 cured in four weeks, and 4 cured in six weeks. In the series of 18 cases, the hearing was improved in 14, 11 of them could hear a whisper 15 feet or more, and 7 could hear a whisper 25 feet or more.

In conclusion I make the statement unreservedly that every case of chronic suppuration is dangerous to the individual and should be operated upon, and that all cases will recover if operation is properly performed; that the hearing will be improved in the large majority of cases; that there is no danger associated with the operation provided the labyrinth is intact. This latter statement is based on approximately two hundred mastoid operations.

Case.	Age.	Sex.	Discharge.	Operative Findings.	Hearing Before and After Operation.		Duration of after treatment
					Before.	After.	
104	26	Female.	Childhood.	Cholesteatoma.	Whisper, 6 inches.	Whisper, 6 feet.	6 weeks.
105	14	Male.	2 years.	Cholesteatoma.	Speech, water 6 feet.	Speech, water 15 feet.	4 weeks.
107	28	Male.	Childhood.	Cholesteatoma.	Whisper, 3 feet.	Whisper, 3 feet.	6 weeks.*
108	19	Female.	Childhood.	Cholesteatoma.	Whisper, water 12 feet.	Whisper, water 26 feet.	4 weeks.
109	10	Male.	Childhood.	Cholesteatoma.	Whisper, 1 foot.	Whisper, 26 feet.	4 weeks.
110	14	Male.	Childhood.	Cholesteatoma.	Whisper, 1 foot.	Whisper, 25 feet.	4 weeks.
111	25	Male.	2 years.	Cholesteatoma.	Whisper, paper, 3 inches.	Whisper, 6 feet.	6 weeks.
113	33	Female.	Childhood.	Cholesteatoma.	Whisper, paper 3 feet.	Whisper, paper 20 feet.	3 weeks.
115	26	Male.	1 year.	Cholesteatoma.	Whisper, paper, 15 feet.	Whisper, paper 26 feet.	4 weeks.
117	16	Male.	Childhood.	Caries.	Whisper, paper 1 foot.	Whisper, paper 6 feet.	4 weeks.
118	12	Male.	5 years.	Caries.	Speech, 3 feet.	Whisper, chair 25 feet.	3 weeks.
119	16	Male.	2 years.	Caries.	Whisper, 25 feet.	Whisper, 3 feet.	4 weeks.*
120	9	Male.	7 years.	Cholesteatoma.	Whisper, 1 foot.	Whisper, 6 feet.	3 weeks.
121	29	Female.	Childhood.	Caries.	Whisper, 6 inches.	Speech, 1 foot.	3 weeks.*
122	29	Female.	Childhood.	Caries.	Whisper, 3 feet.	Speech, 3 feet.	4 weeks.*
123	4	Female.	3½ years.	Cholesteatoma.		Good.	4 weeks.*
124	30	Male.	Childhood.	Cholesteatoma.	Whisper, chair 2 feet.	Whisper, chair 15 feet.	5 weeks.
125	18	Female.	10 years.	Cholesteatoma.	Speech, 2 feet.	Whisper, 25 feet.	4 weeks.

*The duration of the after treatment dates from the day of the radical mastoid operation and not from the day of the graft which was four days later.

CASE 104.—26 years, female. Discharge from ear since childhood. Complains of occasional vertigo and tinnitus.

Examination.—No pain on superficial or deep pressure. Offensive discharge. Anteriorly and above part of the attic wall is destroyed. Below, granulations and a whitish mass. Weber to bad ear. Schwabach, short. Whisper 6 inches. Spontaneous nystagmus, negative. Caloric test positive. Hearing tube whisper, positive.

Operative Findings.—Attic, antrum and mastoid cells filled with cholesteatoma and pus. Sinus uncovered. Skin-graft as usual. Recovery, forty-two days. Whisper 6 feet, improved.

CASE 105.—Jos. C., 14 years. Two years ago had an acute otitis media following scarlet fever; the ear has continued to discharge ever since. For the last year has had more or less pain in the ear, occasional pain in mastoid region. Complains of vertigo and tinnitus at times.

Examination.—Extreme tenderness over tip of mastoid, membrane entirely destroyed, a bony fistula just over and in front of the short process. A fetid discharge. Weber to bad ear. Schwabach, lengthened. Rinne, negative. Speech, "water," 6 feet. Spontaneous nystagmus, negative. Caloric test positive, exaggerated. Hearing tube, positive. Fistula symptoms, negative.

Operative Findings.—Large cholesteatoma, his attacks of dizziness increased by treatment, due probably to the fact that the cholesteatoma absorbed more water and thereby produced pressure on the horizontal canal. The canal stood out quite prominently. In my effort to remove all the carious bone, I produced a fistula. This did not seem to have any effect whatsoever, as he did not complain of dizziness after the operation. On the fourth day, graft. Has made an uninterrupted recovery. Conversation, "water," 15 feet. Twenty-eight days complete healing.

CASE 107.—Female, 28 years. Alcoholic and drug fiend. Discharge from ear since childhood. Headache over this side of the head. No dizziness.

Examination.—Right ear, large polypus almost filling meatus, offensive discharge. Whisper, 3 feet. Weber to bad ear. Rinne, negative. Spontaneous nystagmus, nega-

tive. Caloric test, positive. Hearing tube, positive. Cholesteatoma. Whisper, 3 feet. Six weeks complete epidermization.

CASE 108.—Female, 23 years. Married, three children. Discharge from both ears since childhood. Two years ago, had report in right ear, was so ill following that was compelled to go to bed. Dizziness and vomiting. Since then does not hear from this ear. Discharge stopped. For some months past has been having dizzy spells and vomiting following pain on left side of head.

Examination.—On pressure pain on whole side of head, especially over tip. Foul, offensive discharge. Weber to this ear. Schwabach, normal. Rinne, negative. Spontaneous nystagmus, negative. Caloric test, positive. Hypersensitive. Vertigo and tinnitus present. Hearing tube, positive. Fistula symptom, negative. Hearing, whisper, "water," 12 feet.

Operative Findings.—Cholesteatoma, horizontal canal projecting well into the cavity. During the time of healing and some time since patient has complained of dizziness—with lessened severity and at present some months after operation has it occasionally. The only explanation that I can offer is that the horizontal canal is covered only by graft, thereby exposed to the air, or from pressure of graft on stapes. Hearing, "water," 26 feet. Four weeks.

CASE 109.—Male, age 10. Has had discharge from ear since three years of age. Was under continuous treatment until one year ago. Since then the ear has been syringed by mother once daily. Complains of pain back of ear, pain over whole side of head, acute exacerbation.

Examination.—Whole side of head painful to touch. Mastoid exquisitely sensitive. Temperature, 100. Foul, offensive discharge. Bulging posterior wall. Weber to this ear. Rinne, negative. Schwabach, normal. Vertigo present. Occasional tinnitus. Spontaneous nystagmus, negative. Caloric test, positive. Nystagmus after turning, 40″-40″. Hearing tube, whisper, positive. Hearing before operation, 1 foot.

Operative Findings.—Cholesteatoma, dura and sinus uncovered by caries. Grafts four days later. Made good recovery. Hearing at 25 feet. Four weeks duration of treatment.

CASE 110.—Age 14. For past year has had discharge from left ear, has been under treatment all the time. During the

last year has had dizzy spells with increasing frequency. Has had pain back of ear several times during last year. Complains of frontal headache.

Examination.—Painful on deep pressure over the mastoid. Foul, offensive discharge, masses of debris, probably cholesteatoma. Treated by intratympanic irrigation. Two weeks later returned with an acute exacerbation of the chronic suppuration, increasing dizziness. Weber, bad ear. Rinne, negative. Schwabach, about normal. Vertigo and tinnitus present. Spontaneous nystagmus, negative. Caloric nystagmus, positive, hypersensitive. Nystagmus after turning 35″-36″. Hearing tube, positive for whisper. Hearing, 1 foot.

Findings.—Cholesteatoma, attic, antrum and mastoid cells. Horizontal canal prominent from destruction of bone. In removing carious bone from horizontal canal a fistula was produced. Spontaneous nystagmus to the opposite side for a few days, no other symptoms. Graft four days after operation. Uninterrupted recovery. Hearing at 25 feet.

CASE 111.—Male, age 25. Chronic discharges for one year and a half. Complains of pain during the night. Frequent attacks of vertigo. Headache over this side of head.

Examination.—No pain on deep pressure or percussion. Foul, offensive discharge. Masses of epidermis. Under treatment dizzy spells increased in frequency. Drum membrane entirely destroyed and whitish masses seen high up. Weber to this ear. Schwabach, lengthened. Whisper, "paper," 3 inches. Hearing tube (7 feet), whisper positive. Caloric test, positive, exaggerated. No spontaneous nystagmus.

Operative Findings.—Cholesteatoma and a necrotic mastoid. Horizontal canal stood out quite prominently. I explain the increasing vertigo by the fact that the cholesteatoma absorbed some of the water, making more pressure on the horizontal canal. Whisper, 6 feet, 40 days.

CASE 113.—Female, age 33. Discharge from ear since childhood. Headache on same side of head, back and front. No dizziness. Had an acute exacerbation 3 or 4 months ago. Never treated before.

Examination.—Mastoid sensitive on deep pressure. Membrane destroyed, masses of cholesteatoma protruding from above. Weber to this ear. Rinne, negative. Schwabach,

shortened. Spontaneous nystagmus, negative. Caloric test, positive. Whisper, "paper," 3 feet.

Operative Findings.—Attic and antrum filled with a mass of cholesteatoma. Some few mastoid cells carious. Skin-graft, fourth day. In four days, first dressing. Cavity white. Completely healed in three weeks, twenty-one days.

CASE 115.—Male, age 26. Patient gives a history of discharge for one year. Some vertigo. Has been treated for six weeks by intratympanic irrigation.

Examination.—No pain on deep pressure or percussion. Foul, offensive discharge. Cholesteatoma. Entire destruction of membrane. Weber in both ears. Schwabach, short. Rinne, positive. No spontaneous nystagmus. Caloric nystagmus, positive. Hearing, whisper, "paper," 15 feet.

Operative Findings.—Large cholesteatoma filling antrum and extending into mastoid cells. Skin-graft in four days. Dressed in four days and so continued daily until well, twenty-eight days. Whisper, "paper," 26 feet and more.

CASE 117.—Male, age 16. Discharge from both ears since childhood. Left ear operated three times in New York City. Reoperated by myself. Completely dry. No hearing prior to operation.

Right Ear Examination.—Foul, offensive discharge. Masses of epidermis, probably cholesteatoma. Occasional dizzy attacks. Entire destruction of membrane. Whisper, "paper," 1 foot. Weber to discharging ear. Rinne, negative. Schwabach, shortened. No vertigo or tinnitus. Spontaneous nystagmus, negative. Caloric nystagmus, positive. Fistula symptoms, negative.

Operative Findings.—Extensive caries of the entire mastoid. Skin-graft in usual way. Recovery in four weeks. Whisper, "paper," 1 foot; after whisper, "paper," 6 feet.

CASE 119.—Male, age 16. Two years ago had pneumonia. Acute mastoiditis requiring operation, during the height of the pneumonia. Made complete recovery. Ear well for several months, would discharge at intervals. In two years' time the discharge disappeared entirely ten or twelve times. Decided a radical operation necessary.

Examination.—No pain on superficial or deep pressure.

Heart shaped perforation in inferior quadrant. Weber to this ear. Schwabach, normal. Rinne, positive. Whisper, "water," 25 feet. Caloric test, positive.

Operative Findings.—The cavity which had been made by the former operation had been entirely filled with bone which was composed of small and large cells which were infected. The whole tip removed. The cell extended almost to the median line of the posterior wall of the cranium. The right angle incision closed. Second day after operation marked nystagmus to the opposite side; repeated vomiting. Could hear in this ear. Diagnosed serous labyrinthitis.

Skin-graft fourth day. Immediately after this, vertigo, nausea and vomiting disappeared. Was sitting up the following day.

At my first dressing I found all the clamps and stitches taken out. I think the patient did this. The whole cavity was very much infected. Dressed daily. Improving. Twelve days later so dizzy that cannot leave his bed. Vomiting at intervals for two days. Hearing. No temperature. Two days later some dizziness. No vomiting. Nystagmus somewhat lessened. Recovery in four weeks. Whisper, "glass," 3 feet. Wound back of ear closed August 1st. No more dizziness. Nystagmus almost gone.

CASE 120.—Male, age 9. Has had discharge from ear for last seven years. Has had repeated acute exacerbations, present one began three days ago. No discharge at present. Complains of vertigo and tinnitus.

Examination.—Left side of head painful to pressure. Superficial temperature of this side increased in comparison with other side. So much bulging of the posterior superior canal that it almost fills the meatus. Temperature 102.2°. Weber to this ear. Schwabach, normal. Rinne, negative. Whisper, "paper," 1 foot. Caloric, positive.

Operative Findings.—Cholesteatoma. Dura uncovered by caries. Sinus uncovered by caries. Recovery in three weeks. Whisper, "paper," 6 feet.

CASE 121-122.—Female, age 29. Offensive discharge from both ears since childhood. One year ago right ear stopped discharging. Complains of dizzy spells.

Examination.—Right ear, not sensitive to pressure or per-

cussion. Masses of epidermis. Foul smelling cholesteatoma. Membrane entirely destroyed. Weber to both ears. Schwabach, somewhat shortened. R. E., whisper, "water," 6 inches. Spontaneous nystagmus to the opposite side. More pronounced to the right side. Caloric reaction positive. Fistula symptoms negative. Operation in usual way.

Findings.—Caries of mastoid cells and antrum. Foul pus. Dura uncovered by chisel. Fourth day, skin-graft. Complained of some pain. Dressed third day, one bleeding followed. Some pain following day. Changed dressing, removed two cotton balls. Entire graft in place, cavity white, bleeding from under side of outside flap.

Left ear, no pain on deep pressure or percussion. Foul, offensive discharge. Masses of epidermis simulating cholesteatoma. Membrane entirely destroyed. Weber in both ears. Whisper, "paper," 3 feet. Schwabach somewhat shortened. Rinne, negative. Spontaneous nystagmus to both sides. More pronounced to opposite side. Caloric reaction positive. Very marked with small amount of water. Fistula symptoms negative. Operation usual way.

Findings.—Caries of mastoid cells and antrum full of pus. Sinus uncovered by chisel. The horizontal canal was quite prominent. The cancellous bone had been destroyed by caries. Fourth day, skin-graft. Dressed third day. Some bleeding from outer flap. Dressed following day because of pain in other ear and some dizziness. Cavity absolutely white. Right ear, speech, "water," 1 foot. Recovery in three weeks. Left ear, speech, "coffee," 3 feet. Recovery in four weeks. More or less vertigo, some tinnitus in left ear. The vertigo is disappearing gradually.

CASE 123.—Female, age 4. Discharge from ear three and one-half years. Has had severe pain back of the ear repeatedly. About three weeks ago began to have pain back of ear. One week ago began to swell back of ear.

Examination.—Large swelling back of ear, fluctuates. Increased surface temperature. Exquisitely sensitive. Offensive discharge. Heart shaped perforation low down. Could not make fork examination. Patient hears in this ear. Caloric reaction, positive.

Operative Findings.—Destruction of the greater part of the posterior osseous wall. Cholesteatoma filling up the attic

and antrum which were quite large. Graft and after-treatment carried on in usual way. Cured in four weeks. Good result. Must be good hearing from appearances.

CASE 124.—Male, age 30. Discharge from ear since infancy until five or six years ago when the discharge stopped entirely. Three or four days ago began to have pain back of the ear and over this whole side of the head. Complains of vertigo and tinnitus.

Examination.—Very sensitive over mastoids. Whole side of head sensitive. Ear perfectly dry. Entire destruction of membrane. No bulging of posterior wall. Weber to this ear. Rinne, negative. Schwabach, about normal. Whisper, "chair," 2 feet. No spontaneous nystagmus. Caloric reaction, positive. Fistula symptoms, negative. Hearing tube (7 feet), whisper, positive.

Operative Findings.—Large cholesteatoma with pus under considerable pressure. Dura uncovered in temporal region by caries, was considerably discolored. Was a question if this particular case was safe for graft. Grafted fourth day. Whisper, "chair," 15 feet. Thirty-three days.

CASE 125.—Female, age 18. Hip-joint disease some four years ago, left with deformity. Discharge from ear for last ten years. Never has had pain in ear or back of ear. Headache on this side of head and attacks of vertigo.

Examination.—Not painful on deep pressure in mastoid region. Offensive discharge, entire destruction of membrane. Hearing, speech, 2 feet. Weber to bad ear. Rinne, negative. Schwabach, shortened. Spontaneous nystagmus, negative. Caloric nystagmus, positive. Fistula symptoms, negative.

Operative Findings.—Sclerosed mastoid, chloesteatoma. Horizontal canal stood out from surrounding bone. Skin-graft on fourth day in usual manner. Ear dry in four weeks. Hearing, whisper, twenty-five feet.

In discussion Dr. Horn reported seven cases of skin-graft by my method with approximately the same results as to time in healing and to the improvement in hearing.

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE.
SECTION ON OTOLOGY.

October 14th, 1910.

DR. JOHN B. RAE, CHAIRMAN.

DR. JOHN R. PAGE, SECRETARY.

PRESENTATION OF PATIENTS.

A Case of Sinus Thrombosis With Extensive Accumulation of Free Pus in the Vein; Recovery After Resection of Internal Jugular.*

BY ROBERT L. LOUGHRAN, M. D.,

NEW YORK.

DISCUSSION.

DR. JOHNSON inquired whether the sinus infection occurred after the first operative procedure, or if it existed prior to operation. What was the condition of the sinus at the time the doctor made the first operation and how long after that did he discover the necrotic spot on its wall? Were there pulsations in the sinus, and if so, for how long did they continue after the first operation?

DR. LOUGHRAN replied that he thought that the sinus was infected from the time the patient had the chill and that the infection had advanced without symptoms appearing in the exposed portion of the sinus wall until the condition was well advanced. Pulsation of the sinus was present at the time of the second operation and had been present previously at the time of the first operation. Pulsation in the exposed sinus was no indication that blood was circulating through it.

*See page 134.

It had been clearly demonstrated that pulsation could be present in a section of the sinus that was completely thrombosed, this pulsation being due to transmission through the thrombus of a circulation going on in the sinus above the thrombosed area. Pulsation was, therefore, no contraindication to the presence of a thrombus.

In response to an inquiry from Dr. Dench as to whether a blood culture had been made, Dr. Loughran said that a blood culture had been attempted on two occasions without success, owing to the impossibility of securing a blood vessel of sufficient size to obtain enough blood for examination.

Paper: Mechanical Aids to Hearing.*

By Percy Fridenberg, M. D.,

New York.

DISCUSSION.

Dr. Dench agreed with Dr. Fridenberg that the greater attractiveness of the surgical side of otology had caused a neglect of this side of it. He himself has attended most of the sessions of the section on otology, and this was the first time that he had ever heard a paper on the artificial aids to hearing. Some of his patients use these electrical instruments with advantage, and others derive no benefit. Some of them are obliged to attend board meetings, and they find that this instrument placed on the table is a great aid to them. They can sit about the table and hear practically everything that is said.

Regarding the portable type, where receivers are worn either on the waistcoat or on the dress, they are not very valuable. One of his patients is frequently called upon as an expert witness, and he found that whether addressed by the counsel or the bench, or any other member of the court, he was able to hear better with this instrument than without it; but the portable instruments are not of much value. That is due to this carbon contact. If a current of electricity is passed through the particles of carbon for a considerable time

*See page 138.

polarization will result. This occurs with the table instruments, but more with the portable ones. If you have polarization the instrument is dead. That is remedied by knocking the instrument against some solid object, when the polarization is destroyed.

There have been some rather amusing experiences with these instruments. One man said: "I am all right; it is not necessary for me to have any treatment, for I hear perfectly well." He was not really hearing at all, but was reading the lips, for when the instrument was examined, it was found to be turned off. The switch can be turned off and on, and he was using the instrument with the switch turned off.

In a certain small proportion of cases these portable instruments do some good. Dr. Dench is inclined to advise patients to use the simpler forms—one of the horns or trumpets rather than the complicated electrical instrument; the electrical instrument placed on the table is the choice in a certain type of cases.

With reference to the instruments which depend on the continued stimulation of the auditory nerve, they are to be condemned absolutely. He has a number of cases under observation where these instruments have been used for improvement of the hearing, and without exception they are worse after its use than before.

He agreed with Dr. Fridenberg that the cotton pledget is the best artificial drum membrane we have. There is one advantage in using this artificial drum, for having used them for a certain length of time the hearing is better than before the artificial device was tried. That is owing to the systematic massage which takes place. Just as a man with a stiff elbow may be told to carry a scuttle of coal up the stairs every day, and by exercising the joint it recovers its function. Undoubted advantage has been derived from the use of this device and, contrary to Dr. Fridenberg's experience, he has not always found them irritating. One patient used one of them for three months without trouble. The patients get so that they can introduce the artificial drum better than the doctor himself, for they are able to tell when the pledget is in the proper place. You have only to be careful that they observe surgical cleanliness—that the cotton is sterile, the albolene with which the cotton pledget is moistened is sterile, and that the patient

washes his hands before forming the cotton pledget. If these points are attended to there is not apt to be trouble.

With reference to the concha tube—that is an old idea of Politzer's, and it will be found in one of his books. He says that introducing a small rubber tube into the auditory meatus will frequently help the hearing in old patients. In addition to this separation of the meatal walls, you have the vibration which is transmitted from the cartilaginous meatus to the deeper structures.

Dr. Dench said that he had been much interested in noticing the different forms of sound reflectors which Dr. Fridenberg had presented. Light and sound are reflected in the same way. The idea is to collect the sound waves and throw them into the ear in parallel waves. The curve of the collector or resonator—the reflector—must be more or less parabolic so as to give the maximum amount of sound at the entrance of the tube.

Dr. Duel said that his experience coincided with that of Dr. Fridenberg and Dr. Dench. With regard to the massage vibrator apparatus which is sold with the electrical device for hearing, he had a number of highly intelligent patients who, as shown by careful functional tests, have grown steadily worse under its use, and he wished to add his word of condemnation of it.

Dr. Kerrison said that Dr. Fridenberg's remarks on mechanical aids to hearing were both interesting and of practical value. As bearing upon the mechanism of artificial drums, Dr. Kerrison wished to refer to some recent experiments by Dr. Barany of Vienna. Dr. Barany, in common with other otologists, found difficulty in explaining why the application of an artificial drum was in some cases successful and in others of no advantage to the patient. He had assumed that the cases of failure were due to the difficulty of accomplishing proper contact with the head of the stapes or incudostapedial articulation. In order to throw light upon this he tried the following experiment, using as subject a patient with chronic suppurative otitis media, whose drum membrane was practically destroyed. Into this patient's ear a small quantity of mercury was poured. When the patient's head was bent toward the side not experimented upon, so that the

mercury covered the inner tympanic wall and both labyrinthine windows, it was found that the hearing was entirely cut off. When, however, the head was partly raised to the upright position, it was found that a marked increase of hearing was accomplished. Examining the ear, it was found that the mercury with the head in this position covered the niche of the round window, but was not in contact with the oval window. Again, in order to elucidate this phenomenon, Dr. Barany had constructed a small glass model of the ear, consisting simply of a small glass tube with a tubular depression or prolongation from the lower end, this being designed to represent the niche of the round window. It was found that when mercury was dropped into this tube, it quickly filled the bottom of the tube proper, but did not enter the small tubular prolongation from which the mercury was always excluded by a column of air. Returning now to the experiment with his patient, Barany assumed that the mercury apparently covering the round window did not in reality enter this niche, being excluded therefrom by a column of air which invariably separated the body of the mercury from the membrane of the round window. Barany's theory, which seems to be logical, is that the deafness in cases of destruction of the drum membrane is due frequently, not to fixation of the stapes, nor to structural closure of the round window, but to the fact that sound waves entering the auditory canal strike simultaneously upon both the foot plate of the stapes and the membrane of the round window and that, therefore, the membrane of the round window is prevented from compensating for the movements of the stapes. In Barany's mercury experiment, however, the inertia of the body of mercury prevents sound waves from affecting the membrane of the round window, and the column of air between the mercury and the membrane of the round window enables this membrane to compensate for the movements of the stapes, thus enabling the latter to transmit sound waves through the labyrinthine fluids.

Dr. Smyth asked Dr. Dench to be a little more specific in regard to his method of introducing the pledgets into the ear.

Dr. Dench said that he takes the ordinary cotton applicator and winds the cotton around it, allowing the cotton to project beyond the end of the applicator. Roll it very firmly

on the applicator, then pat down the cotton over the top, like a mushroom; then slipping it from the applicator, cut off a part of the long shank, leaving perhaps an eighth of an inch projecting, or the patient would be apt to pull it out. This is moistened in sterile albolene, then put on a sterile gauze towel, which takes off the excess of albolene. The pledget is then taken with a pair of fine forceps and introduced into the ear, directing it carefully until it is laid directly over the head of the stapes. It usually has to be shifted from side to side and up and down until it is as nearly over the head of the stapes or the oval window as you can get it. By guiding it with a fine applicator you will find the position in which the patient will hear best. At first you have to make several trials, but as you use it more and more the patient will tell you where to place it. In fact, some patients can place the pledget better than the surgeon himself. One of these pledgets was left in the ear of a patient for nearly three months, and there was no discharge from the ear.

In reply to an inquiry as to whether the ear was cocainized, Dr. Dench answered in the negative.

Dr. Heller said that working along these lines Neumann and Alexander found that the cotton did not remain sterile, and they looked about for something which would remain sterile; they made experiments with silver and gold foil, and obtained some very good results. He himself has tried it in one or two cases since his return, and the chief difficulty is to get a mass in that will stay. The minute silver foil is touched it will fly over and lump. Neumann and Alexander, however, have used it in a number of cases where it worked very well and stayed in place for several days.

Dr. Dench said that he had used this form in cases where the opening was particularly large, but in cases where there is simply a perforation he makes use of a paper disc—using a piece of moderately thin paper, such as foreign bond paper which is very thin and very tough. Cutting a circular disk, it is sterilized in alcohol and bichlorid (1-3000) and then laid over the perforation. The result in some cases is really marvelous.

Dr. Voislawsky said that he had had one such case in

which he made use of cigarette paper, placing it over the drum membrane, and it stayed in place for several days; but when the patient reported he had an acute condition which developed into a mastoid and became very serious. It may have been due to faulty technic, or may have been due to an infection which was shut in, but he has not tried it again. However, if Dr. Dench has used it successfully for many years, he felt tempted to try it again. This case was a perforation of long standing—at least ten or fifteen years.

Dr. Dench inquired whether the ear was dry, and Dr. Voislawsky replied that he could not now say. It happened some eight or nine years ago, and he had not spoken of it before, but he recalled that he had moistened the paper and sterilized it.

Dr. Dench said that of course if the ear is not surgically clean and this pledget is inserted, a lot of damage may be done, although he himself frequently covers a perforation in an acute case, when the discharge has ceased for twenty-four hours. He puts a piece of paper over the membrane and seals it up, for the field is sterile and the drum will heal more quickly than if left exposed to the air. There is a certain amount of tension and the cicatrix will stretch unless supported. In such instances, however, one must be very careful, and examine the ear every day.

Dr. Jarecky said that he had been using cotton in those cases where the drum membrane was missing, not only as an aid to hearing but as a curative agent. One case came to him with the ear closed with paper in which the mastoid was involved and which he operated. Since that time he had used cotton, not wet but dry. In the old suppurative cases which were dry, he wiped out the cavity with an alcohol-bichlorid solution and then applied the cotton to close the whole perforation. This could stay in for a week or more, as long as it remained dry. In the more recent cases, in which the discharge had diminished to a slight quantity, he used the cotton but changed it daily or every other day. In these cases the cotton sometimes adheres to the opening, and in removing it a crust comes away which often starts the healing process. Sometimes it is better to moisten the cotton before removing it. The pledget of cotton must be flattened well, as

any filaments inside the perforation produce a sensation of noise very disagreeable to the patient. He has had no trouble with any of his cases, and found a great improvement in the hearing of those cases which are attended to regularly.

Dr. Johnson said that doubtless all had seen many suppurative ear cases where patients have been trying patent ear drums and have come later to the otologist to have them taken out after they had been worn for considerable periods of time; also he had known those who could put them in, the result, as to hearing, being better than the otologist could attain. He has also seen cases which have heard very well with the Toynbee ear drum. This drum, made with a plated wire stem, was sold to a great many people some time ago under a special name for $5. He would like to know how many of those present had seen suppurative cases which have gone on to mastoid disease where artificial drums had been worn. Many of these people put the drums in themselves, and it is a question whether their methods were very aseptic, still it is a very rare thing for mastoid disease to develop which can be traced to the use of any mechanical appliance. In relation to the electrical devices by any names, there are cases in which they are of great benefit, especially for the collection of musical sounds as at the theater or opera, and the doctor said he could recall two cases who would not be without them for this purpose.

Dr. Johnson said that he knew at least two patients who were much benefited by the electrical apparatus in listening to music and conversation, and in the theaters. While many are not willing to persevere with the electrical aids, these persons use it carefully and scientifically. Many cast them aside with inadequate trial, saying that they are no good. There are little noises and sounds where they make connection between the battery and the resonator, and all of these things disturb them at first. It is largely a matter of education. The ear has to be educated to use an electrical apparatus. The conditions are absolutely changed when using them, and the sounds must be analyzed as they come through the apparatus. They are certainly accentuated. These two patients have attended the opera with increasing deafness, and have finally got cured. At first they could get no pleasure out of it.

DR. DENCH said that these electrical apparatus had been introduced into many of the churches and several of his patients really enjoy the sermon.

DR. DUEL said that in support of Barany's position in regard to the difference of balance in the two windows, as described by Dr. Kerrison, he recalled an experiment he himself had made some years ago. He had been using pledgets such as Dr. Dench had taught him to make many years ago, and not succeeding with a patient he made a stiffer and larger stem and covered it with collodion, then cut it off, leaving a pretty long stem and making rather a heavy appliance. Much to his surprise, when this was inserted into the patient's ear, after some manipulation, a striking improvement in the hearing suddenly occurred. It was left in the ear, and when the patient reported the next day she said that this improvement had lasted for a certain number of hours until the appliance slipped out of position. The experiment was repeated, and after a number of trials it was found that she could adjust the artificial drums better than he himself could. As she lived far from New York, and was anxious to have the relief they afforded, he devised a method by which she could make them herself with the aid of a piece of wire roughened and cut the proper length. This patient wrote to him at long intervals for a number of years and repeatedly reported great improvement in hearing by this method. If Barany's contention is correct, that it is the difference in the balance, then this false drum—heavier than the light ones commonly used—had been the cause of the greater improvement. He had tried this same method a number of times since, and on a few occasions had obtained striking results, but there had also been many failures.

Replying to a query from Dr. Dench, as to whether the mushroom part of the pledget was moist or dry, Dr. Duel said that the large flat part was made perfectly smooth with collodion and dipped in vaseline before it was inserted.

DR. FRIDENBERG said that he had forgotten to mention that in their circulars the acousticon people claim that they adapt different types of instrument to different kinds of deafness, and they recommend that the patients come to their office to be fitted. He went to see what their adaptation consisted of,

and found that they have four or five different receivers. The only effect of that is to shut out a certain number of sounds—there is no selection of sound as it approaches. He had thought that they might have something like the apparatus used with the telephone receiver; it would be a very great improvement if we could have low tones transmitted in a high frequency wave. They simply have a low intensity which is easily set in motion. That does not give so loud a sound but a great deal of vibration; the higher the resistance to the wave the less intensity has the sound, but also the less vibration from the sound, and in that sense there may be some advantage in having the patient test which instrument suits him best; but after all we have to have them try one or two different forms of instrument. If a patient is sent to the shop and a trolley car is passing while the test is being made, they cannot test hearing accurately.

As Dr. Dench had said, there is no doubt that auto-suggestion plays a large part in this matter. If a series of cases could be studied carefully and tested with these various instruments, we would gain some very valuable information. In the cases mentioned tonight, there was a history of decided improvement after using the drum. What kind of cases were these? There are a number of little points that have to be taken into consideration. Careful tests of hearing must be made with voice and tuning forks. An accurate diagnosis of the form of ear disease is essential.

There are many ways in which patients who are hard of hearing can be helped without having to wear a hearing tube. They should be encouraged to study lip reading. That is very important. Another way is for those addressing them to speak more clearly. It is not always the loudness of the voice; it is the clearness of enunciation. Another important point is exercise of speech for those who are hard of hearing. One thing that they suffer from is not knowing how loudly they themselves are speaking. The friend to whom he had referred said that he would like some one to tell him how loud he was speaking. He had no guide in his own ear.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON OTOLOGY.

November 11, 1910.

A Case of Cerebellar Abscess Presenting Certain Features Suggestive of Labyrinthine Suppuration; Differential Points; Operation; Recovery.*

By Philip D. Kerrison, M. D.,

New York.

DISCUSSION.

Dr. Dench said that Dr. Kerrison had summed up the treatment in saying that he did not manipulate the parts too much. We have probably all been exploring cerebral cavities too freely for pus. If the pus is evacuated with as little manipulation as possible the chances are better than if an attempt is made to clean out every nook and cranny of the abscess cavity. The brain will take care of a certain amount of suppuration the same as any other viscus in the body. Dr. Kerrison had simply put in a drain and allowed the pus to find its way to the surface. He disagreed, however, with Dr. Kerrison's statement that the caloric reaction in this connection made the case a unique one.

Dr. Kerrison, in response to Dr. Dench's statement that several cases in which cerebellar abscess had been the direct cause of loss of vestibular irritability had been reported by Dr. Neumann, said that he believed that Dr. Dench was in error. He had discussed this particular point with Dr. Barany when recently in Vienna and he believed that up to that time no such case had been recorded.

Replying to Dr. Rae, as to whether any other than the caloric tests had been applied, Dr. Kerrison said that the patient at the time was very ill and could not stand, so that

*See page 43.

rotation tests were not tried. Her hearing is now very good. The caloric reaction had been recently retested, and the result was absolutely negative.

Demonstration and Comparison of the Various Electric Suction Massage Vibrators.

Dr. Wendell C. Phillips said that he wished to show the difference in the working of these electric vibrators in order to call attention to the fact that certain patented and much advertised ones possess no advantages over those which can be obtained in the open market.

The first apparatus shown was the auricular pressure and suction vibrator which is rented to physicians for so much per month and is not supposed to be on the market for sale, though this one had been purchased by the owner after having rented it for some months. He demonstrated that it was the usual telephone vibrating disc set in motion by storage batteries. It gave but little vibration except upon attaching an ordinary piston syringe, and hence it was really suction by hand force. It also had a Politzer bag connected to the same cylinder, which upon pressure forced air into the ear. This machine makes both compression and aspiration; that is all it does, no more.

He also demonstrated an electric vibrating apparatus, which was devised in part by the late Dr. Houghton. This apparatus was capable of producing all types and all degrees of vibration for the ear and was obtainable in the open market.

He did not wish to be understood as advocating massage treatment.

Dr. Phillips also demonstrated the forms of noise produced for use in testing the vestibular function.

DISCUSSION.

Dr. Dench inquired whether Dr. Phillips had ever seen anything but harm come from the use of these noise producers. He has seen much harm result from their use.

Dr. Bryant stated that in one particular he considers the Meyer vibrator better than all other vibrating contrivances; it produces intense sounds having low fundamentals. He has

used a machine of this type for over a year and has obtained better results with it than with any other vibrator. He has found it to work well in all forms of chronic sound conduction impairment. The low-pitched sound produced by the machine is of sufficient intensity to cause an appreciable mobilization of rigid parts.

It is possible to carry the use of the vibrator to excess, but the instrument is not, Dr. Bryant thinks, detrimental to hearing, as are many other vibrators. Nothing but advantage is derived from the sound of low pitch. There may be danger in the use of the vibrator in acute cases. Dr. Bryant, however, has never seen any ill effects from the use of the machine.

DR. KERRISON, referring to Dr. Phillips' remarks in regard to auditory massage, said that he did not see that the various apparatus exhibited were based on any other principle than that which was the basis of all the older instruments which were on the market. Dr. Duel and Dr. Dench and others had reported cases in which deaf patients had used the massicon with consequent very considerable loss of hearing. Dr. Kerrison said that so far as he could see the massicon, which was generally condemned by otologists, and the apparatus exhibited tonight, produced their results in the same way, except in so far as the latter combined a low tone with alternate condensation and rarefaction of air in the auditory meatus. He agreed with Dr. Bryant that the use of the low musical tone might be a useful factor in auditory massage, since the low tone produced the infrequent vibrations which the drum membrane and ossicular chain had in most cases lost the power of responding to. Dr. Preobraschensky, of Moscow, had recently published the results of a rather extensive investigation of the different methods of auditory massage. In summing up his conclusions, he expressed the belief that any apparatus which hermetically closed the auditory meatus and alternately condensed and rarefied the air in the canal, was a crude method which produced such excessive excursions of the drum membrane as could not fail to be injurious.

DR. DENCH said that all forms of suction appartus had been gone over again and again. Delstanche, of Brussells, had taken the Lenval prize for his masseur, which was simply a

condensation and rarefaction apparatus, and it is worthless. What Dr. Bryant had said about the use of the low tone was worthy of a trial, though he did not think it would do any good. At the same time, Dr. Bryant claims to have had one positive result, which is worth a thousand negative ones. If a vibration of that character will mobilize the ossicular chain, it certainly would do good, where the lowest tones are cut off. As for the alternate condensation and rarefaction of the air in the canal, that has been proven to be worthless, as have also the ordinary forms of apparatus which produce the "big noise" in the ear. He has seen a great deal of damage result from them.

Dr. Bryant, in reply to an inquiry from Dr. Phillips as to what he called "good results," cited the case of a patient who had defective hearing for thirty years, so that he could not hear the ordinary human voice at a distance of over two inches. After treatment with the machine the patient was able to hear the same voice at a distance of ten feet. That, Dr. Bryant stated, he considers a "good result."

Dr. Phillips said that he had never had any such experience, but he did think there was something in the vibration which gives the patient a sensation of relief. After using it some patients come back and ask for it again, and say that they feel better for it. The owner of this machine claimed that it was the most magnificent placebo he had ever employed. That while some may be made worse by the massage, there are others who claim that the continuous use improves them. There are two sides to the question, as to most others.

Dr. H. B. Brown said that he had examined the apparatus, and had had it applied to his ears by Dr. Cook. He was satisfied that vibration is produced, and felt that much care ought to be exercised by any one who uses the instrument. He believed that the claim made for the apparatus by its inventor was not so much in favor of its producing hearing as in relieving tinnitus, but even after the tinnitus had been partially overcome, it is still necessary for the patient to have an application at least once a month, in order to not relapse into the original condition. In other words, it does not cure.

DR. DENCH said that he had seen instruments upon the acousticon principle used in a number of cases, and in only one case had the patient declared himself benefited. He agreed with Dr. Brown that all forms of noise-producing devices did more harm than good. These devices may relieve tinnitus for the time being, but they do so simply by fatiguing the auditory nerve to such an extent that the subjective noises are temporarily rendered imperceptible. If this fatigue is continued, the function of the nerve gradually becomes impaired, and the patient's hearing will steadily deteriorate.

Dr. Dench had seen numerous bad results from the use of instruments of this character. If any form of apparatus were devised which would give a pure musical tone, of from 16 to 40 double vibrations per second, and this apparatus were used to exercise the auditory apparatus, some advantage might be hoped for in selected cases where the impairment in the hearing depended upon beginning fixation of the ossicular chain. Such apparatus could probably be used without very much risk. At the present time, however, he knew of no apparatus of this character.

DR. DUEL said that the noises produced by the machine were not what might be called musical tones, which would give the vibrations referred to by Dr. Dench.

DR. DENCH said that any sound which is repeated over sixteen times a second is a musical tone.

DR. DUEL said that double vibrations of equal amplitude, either above or below sixteen, would produce a simple musical tone; that when two tones were produced simultaneously they were harmonious if the vibration numbers were the same; that two tones produced consonance if their vibration numbers were in perfect ratio, the simpler the ratio the more perfect the consonance. For instance, the simple ratio of 2:1 or the octave produced perfect consonance; the ratio of 3:2 the consonance of the fifth; 4:3 that of the fourth; 5:3 the major sixth, etc. On the other hand, when two or more tones were produced by vibrations which were not in ratio, dissonance; a disagreeable noise to the ear was evident, and to his mind that was what occurred in this machine.

Paper: A Report of a Few Cases of Otitis Media Suppurativa Treated With Suspensions of Lactic Acid Bacilli.*

By W. H. Haskin, M. D.,

New York.

DISCUSSION.

Dr. Hays said that shortly after Dr. Holbrook Curtis made his report, he obtained a supply of the lactic acid culture from the Lederle laboratory. The culture was put up in two-ounce bottles, much more than could be used at one time. Lately it has been marketed in half ounce phials. Although the lactic acid bacillus is supposed to destroy other organisms in the body, there was no doubt that the culture sent to him did not do so; for in a very short time a scum appeared on the top of the culture. He took some of this solution down to the New York Eye and Ear Infirmary to try it on some cases of chronic ear suppuration. Examination of a smear from the culture a day or so after it had been opened showed the lactic acid bacillus, various other contaminating organisms and a fungus. He believes that the various reports that have been made have been inaccurate, unless the man who has used the culture has used a fresh solution each time. Few men have thermostats in their offices, and therefore the reports have been unsatisfactory. Moreover, it is a question whether the lactic acid bacillus itself or something generated in the culture does the work. This remains to be proved. It becomes a still more complicated problem if good results have been obtained from the contaminated culture. He had made these criticisms to Dr. North, whereupon Dr. North sent him some statistics to prove that he was wrong. After using the cultures of the bacillus bulgaricus on numerous nose, throat and ear cases with no result that could be attributed to the culture itself, he came to the conclusion that whatever advantages are attributed to the lactic acid cultures are due mainly to the especial care that is given to the patient in the way of cleanliness, etc., and if formalin or anything of that sort were used, the results would be equally good. In the form that it is used at present, he is convinced that the lactic acid culture in itself does not have the redeeming qualities claimed for it.

*See page 49.

DR. DWYER said that in their experience they had no trouble whatever from contaminations, as the method of preparing and using the cultures precluded all dangers of these and thus one of the great reasons for failure was excluded. In the early part of the experiments the cultures were supplied almost daily by Schieffelin & Co., and thus the potency and the purity of the cultures were assured. Later on, he made the cultures fresh at the College of Physicians and Surgeons and they were also made fresh daily at the laboratory of the Manhattan Eye and Ear Hospital through the courtesy of the pathologist, Dr. Strong. The directions given to the patients were very explicit and very precise. They came regularly three times a week and were given full instructions that everything was to be sterilized and kept absolutely clean, and the same precautions against contamination were to be taken at home as the nurses took in the clinic. The cultures were always kept on ice. If this is not done, and contamination takes place, the culture rapidly spoils and should not be used. By using these precautions they have had no trouble whatever from contaminations.

Paper: Some Remarks on Sinus Thrombosis With Particular Reference to the Diagnostic Value of Blood Cultures in Otitic Disease.*

BY SEYMOUR OPPENHEIMER, M. D.,

NEW YORK.

DISCUSSION.

DR. EMIL GRUENING said that he was very much interested in the paper of Dr. Seymour Oppenheimer, who agreed in the main with the essence of the paper read by Dr. Gruening before the society over a year ago. The subject of sinus thrombosis, with particular reference to the diagnostic value of blood cultures, has since that time been repeatedly discussed. So much so that European writers, especially Ruttin, have gathered that in America the clinical symptoms are not used as a guide for diagnosis, but that reliance has been placed chiefly on the blood culture. This is a misapprehension, as is

*See Page 109.

clearly proved in the statement from the paper of Dr. Gruening, who says that in the whole group of the ten cases mentioned the diagnosis of sinus thrombosis was made from the clinical symptoms alone, and that the blood culture was not necessary for the corroboration of the diagnosis. It was nevertheless done by the pathologists in order to become acquainted with the relation that sinus thrombosis bears to systemic infection. In three of the cases mentioned the blood culture was negative, the clinical symptoms, however, were positive, and the operations demonstrated the presence of thrombi. Instructive and helpful as the blood culture may be, we must still rely chiefly upon the clinical symptoms, which are sufficiently well pronounced to determine the proper course of action. This is fortunate as, in the country at large, laboratories are not at the disposal of the clinician.

In the group of symptoms enumerated by Dr. Oppenheimer as characteristic of sinus thrombosis I miss one which is very important, *i. e.*, the septic euphoria in uncomplicated cases. A patient who, in the morning, has had a chill and a temperature of 106, will, after the subsidence of these symptoms, greet the consultant with a smile and a hearty handshake, and tell him that there is really nothing the matter save that he cannot get enough to eat. This optimistic view of his own condition does not occur in any other serious complication of otitic disease.

In the strata of society which furnish patients to the hospital wards, a chronic discharge from the ear is not considered of much significance, and when in the course of this ear disease, high temperature, headaches, chills, vomiting and other distressing symptoms occur, the patient may be considered as a medical case and be admitted to the medical department of the hospital. In the anamnestic data the previously existing ear discharge will be given its proper significance, and the ear may well be suspected as the source of trouble.

Dr. Libman, who is connected with the medical service of the hospital, had the opportunity of recognizing such cases, and of transferring them to the aural service. That the recognition of these cases is not solely dependent on the blood culture, but rather on careful analysis of clinical symptoms, together with the history of the case, is proven by the fact that Dr. Henry W. Berg and Dr. Bernard S. Oppen-

heimer also referred such cases to the aural department without having made a blood culture.

DR. WHITING said that he had been greatly entertained by Dr. Oppenheimer. He had laid much importance in the early part of the paper on the fact that the value of the bacteremia was chiefly in those cases that were more or less obscure. As Dr. Gruening had said, many of the cases we see are so plain they do not require the additional evidence of a blood culture to help out. We are oftentimes, however, up against a proposition which is extremely difficult to handle, for the symptoms are not always so plain as Dr. Gruening would have us think. He underestimates the frequency with which we encounter these cases, but we do meet many where the symptoms are not sufficiently definite to warrant us in operating. Dr. Oppenheimer had stated the symptoms in a most careful manner, and has said that we rely largely upon the presence of a bacteremia to determine us in regard to operating when the clinical manifestations are obscure. That has my cordial endorsement.

The value of blood culture can be classified under three headings:

1. Given a suppurating ear, with bacteremia, in the absence of other demonstrable diseases, and I think the assumption that sinus phlebitis exists is warranted.

2. Is there a likelihood that bacteremia, if present, will be demonstrated by blood examination? Dr. Oppenheimer has shown from statistics, and my own experience corroborates them, that in the vast majority of cases it is possible to find a bacteremia—if not at the first examination, then at the second, or perhaps upon subsequent examinations.

3. Does a negative finding prove the absence of a sinus phlebitis? While all agree that it does not, it is very suggestive of the absence of sinus phlebitis, and with the absence of strong corroborative symptoms is sufficient to deter us from operating at once. In any case, where the clinical evidence is in doubt, the presence of a bacteremia must be regarded as strong corroborative evidence.

DR. E. LIBMAN said: I hardly feel that it is necessary to discuss at any length this evening, because everything that has been so far brought up I have discussed at length in the

paper by Dr. Celler and myself and in remarks previously made before this society and the American Otological Society. As far as I could judge from the paper of Dr. Oppenheimer, he lays too much stress on the work of foreign observers. The work which we did was done without knowledge of any foreign work and not done at the request of any clinician. Kobrak did not state that the finding of bacteria in the blood could be used for the diagnosis of sinus thrombosis, because he claimed to have found bacteria in the blood in cases in which he makes no mention of there being present a sinus thrombosis. According to his clinical description, some of these cases may have been cases of sinus thrombosis. Leutert and his assistant, Nuerenberg, were afraid of stating that the finding of streptococci in the peripheral blood was of value in the diagnosis of sinus thrombosis. They feared that streptococci might have come in from another disease focus, such as an angina; that is why they recommended taking cultures from the sinus and from the peripheral blood. The method of Leutert does not appear to me to be a very good one, because it seems that there would be difficulty in getting reliable results when one punctures through an unclean field, as one must do when one punctures a sinus in a case of mastoiditis. To be absolutely sure of one's results, one would have to disinfect the sinus, and any method by means of which one could be sure of obtaining reliable results might cause trouble in the sinus wall. When a patient has double mastoiditis, and there is a suspicion of sinus thrombosis, it might be well worth while trying the method of Leutert, so as to see if one could get a definite clue as to which side to operate upon. We expect to make a study of the value of the method.

In the course of the studies made since the time of our last publication, we have met with no experience that would lead us to change the view-points which Dr. Celler and I expressed in our paper. On one minor point we have a change to make. We stated in our paper that in our experience, as in the experience of most observers, blood cultures are positive in cases of erysipelas only when the latter is fatal to the patient. We have met with one patient recently who had a carcinoma of the breast in whom erysipelas developed after operation. Streptococci were found in this patient's blood and the patient recovered. But in our earlier paper we

drew attention to the necessity of looking out for erysipelas as a possible cause of streptococcemia.

As regards the negative blood cultures, there is very little to say, as Dr. Oppenheimer has in his paper given you all the facts Dr. Celler and I established in our paper. It has occurred to me recently that in some of the chronic cases there may be anaerobes in the blood, and as we have used aerobic methods only we may have missed anaerobes. In the course of our last studies, however, we have not had any of the longer standing cases of sinus thrombosis.

We have nothing new to add as regards the disappearance of bacteria from the blood after the jugular vein has been ligated, or in some cases after the sinus was operated upon and the jugular vein was not ligated.

We have studied a number of cases of mastoid disease according to the method suggested by Duel and Wright and have used our own method as a control, but we found no difference in the two methods. We have not been getting positive results in uncomplicated cases of otitis media and uncomplicated cases of mastoid disease. We therefore cannot agree with the findings of Duel and Wright. As stated in a note at the end of our paper which we published last year in the *American Journal of Medical Sciences,* we tested the method of Duel and Wright in a large number of cases of different types of local infection. We picked cases that were very mild, in other words cases that were not likely to be accompanied by a general infection. The diseases of the type which we chose when severe are often accompanied by a general bacterial infection. In all the cases which we had of the mild forms of these infections blood cultures were negative, both according to our method and the method of Duel and Wright.

In the last year Drs. Fried and Sophian, of our laboratory, have made microscopic studies of the blood in a number of cases to see whether we could make the diagnosis more quickly in some of the cases of sinus thrombosis. In one case cocci were found, although the blood culture was negative. This work will have to be continued. One must be very careful in judging results obtained by this method, for even with the most careful technic errors are likely to creep in. However, one essential piece of evidence we did obtain, and that is that

in cases of uncomplicated otitis media and mastoid disease we found no bacteria in the blood microscopically, thus confirming the results we have hitherto had in our blood culture studies.

In my opinion it is essential for the otologists to have in connection with their complicated cases not only a bacteriologist but also an internist, because some of the cases are exceedingly difficult to unravel. It is true that in many cases of sinus thrombosis the diagnosis is perfectly clear clinically, but we have seen cases repeatedly in which the diagnosis was decidedly in doubt before the blood culture evidence was obtained, and it even happens that the otologist may be in doubt after he has the sinus exposed. I remember seeing a case in which the sinus was exposed and declared negative by a competent observer. After operation a blood culture was taken which showed streptococci, but the following day when the report was handed in the patient was already in too bad condition for the jugular operation to be attempted. The autopsy showed a fairly extensive thrombosis of the lateral sinus.

I cannot agree with the statement of Dr. Gruening that all the cases of sinus thrombosis are easily diagnosed clinically. In fact the investigations which we have made were started with the study of a case which Dr. Gruening refused to operate upon for supposed mastoiditis and sinus thrombosis, because sufficient clinical evidence was not present. When streptococci were found in the blood and I suggested that as the patient had otitis media and no other primary focus, it might be wise to explore the mastoid process, not only was mastoid disease found but also sinus thrombosis. And I have seen a number of other cases in which the clinician was decidedly helped by bacteriologic investigations. In all the cases of sinus thrombosis in which we have had positive blood cultures there has been evidence of ear disease, but in a number of them there has been nothing to point to mastoid involvement or involvement of the sinus.

So that there should be no doubt as to our opinion regarding bacteremia in local infections, I want to state that we do not say that one does not get general infections in the types of disease which we studied in an attempt to find out whether there are any differences in our method and the

method proposed by Duel and Wright. We purposely chose very mild forms of disease, in fact most were ambulant cases. We chose these cases because Drs. Duel and Wright found positive results even in ambulant cases of otitis media.

DR. DUEL said that during the last few years an immense amount of work had been done in the clinical examination of blood. He himself was neither a laboratory man nor a pathologist, and the only ground on which he could venture to discuss these papers must be that he had a little common sense in interpreting evidence as presented by others. These blood examinations had been made not only in the Mount Sinai Hospital but in many other places, and by many investigators; and the combined evidence warranted in his opinion a less positive conclusion regarding the result which had been recorded at Mount Sinai Hospital. Indeed he looked upon the conclusions in the paper as entirely unwarranted in the light of the combined evidence, however much they may have been justified by the obesrvations in that institution alone. For instance, there seemed to be no reason why Dr. Libman, Dr. Celler, or Dr. Oppenheimer should ignore the results of Kobrak, simply because he happened to repeatedly demonstrate bacteremia in mastoiditis, or simple otitis media, without sinus involvement; and there seemed to be no good reason why because a different method had been used than that which had been employed in the Mount Sinai laboratory that they should ignore four similar cases reported by McKernon, the laboratory work having been done by such competent men as Sondern and Brooks, or nine similar cases reported by Wright and himself, the laboratory work having been done by Miss Gimoux at the laboratory of the Manhattan Eye, Ear and Throat Hospital.

He had recently read some voluminous notes by Dr. Guntzer, who had gone over the literature carefully. He hoped that Dr. Guntzer would relate more specifically certain evidences which he could only refer to in a desultory way. It had been established that a bacteremia occurred in practically all infectious diseases, and in all cases in which suppurative foci appeared in any part of the body.

It had by no means been determined that these bacteria never entered the blood current except as the result of a blood

clot in the region where the infection took place. In fact it was much more probable that the bacteria began to enter the circulation long before the thrombus formed. It was the usual order that the presence of bacteria in the blood was concomitant with clinical symptoms which manifested their presence, but on the other hand, there were a large number of cases in which bacteremia had been demonstrated without manifestations. He hoped Dr. Guntzer would refer to this point and to Ludke's paper, published in the *Muenchener med. Wochenschrift* about a year ago on the subject of latent microbism. He demonstrated the presence of many different bacteria throughout the different organs of the body and in the blood, lymph channels, etc., in individuals who were apparently perfectly healthy. In some instances this continued for weeks or months. Other observers had also demonstrated similar conditions.

Now, if all this evidence was accepted, it was well that this subject has been brought up again, and that such men as had discussed it should present the other side. He believed that if all concurred with the smug position that septic sinus thrombosis could be so easily demonstrated by the presence of a bacteremia, they might eventually find such a position very untenable in the light of all the evidence.

Dr. Libman had said that if we had demonstrated bacteremia in connection with otitis and without sinus thrombosis, then we had finished with the subject. As a matter of fact we know very little about this question of the blood, much less than we would know a few years hence, and I believe that Libman had punctured his own toy balloon when he made such a statement.

From a practical standpoint, what does it mean to us? It means that we may learn much by careful study of the blood in connection with these septic cases; but we must remember that the subject is not yet finished, and we shall probably have to change our base very much in regard to our conclusions if we go too far on our present knowledge. The fact that there were nine cases reported by Wright and himself and four by McKernon, in which a bacteremia was demonstrated in suppurations of the middle ear and mastoiditis with no untoward symptoms, was very important. When one argued on the one hand that the presence of bacteremia

without clinical symptoms in the presence of a suppurating ear, necessitates the ligation or excision of the jugular, or, on the other hand, that the absence of a bacteremia in the presence of clinical symptoms signified that one must wait for another twenty-four or forty-eight hours, or even longer, before operating to demonstrate the bacteremia, it seems like poor judgment.

Dr. McKernon said that he had nothing to add to what had been said, excepting that when Dr. Libman first read his paper he (Dr. McKernon) asked two other pathologists besides those at the Manhattan Eye and Ear Hospital to make a blood culture in cases where the mastoid had been operated upon, in order to determine whether there were any bacteria in the blood. Dr. Wright examined several cases and in six of these—pure mostoid cases—the blood culture was taken the day of the operation, and he reported a bacteremia present. Whether Dr. Wright's method was different from that employed by Dr. Libman, he did not know. In a case where Dr. Sondern made a blood culture there was a mastoid with a high temperature. He reported bacteremia present, and the case was operated upon; it continued to run a high temperature for four or five days, and then followed the usual course of convalescence. In the two cases of Dr. Brooks—simple mastoids also—cultures were taken just prior to operation, and all reported bacteremia, and all the cases went on to perfect convalescence. Dr. McKernon said that he did not know the methods used by Dr. Sondern or Dr. Brooks, or how they differed from those of Dr. Wright and Dr. Libman; he simply had their reports of bacteremia being present.

Dr. Oppenheimer made one statement which should be corrected. He said that in certain cases of sinus thrombosis it is not policy to open and explore the sinus. All of us who have been doing this work come upon some cases after we expose the sinus where it is absolutely impossible to determine whether there is an infection there or not, and you must open it to find out.

Dr. Dench said that the whole matter could be boiled down by saying that if you have a case of suspected sinus thrombosis, and if bacteremia is present, you will probably operate. On the other hand, if you have a case of suspected sinus throm-

bosis, without bacteremia, you will probably operate also. In other words, while the bacteriologic examination of the blood is of value, it amounts to about the same thing as the differential blood count—that is, it offers strong confirmatory evidence of the condition, but it does not enable one to make a positive diagnosis. The absence of bacteremia is of but little importance if clinical symptoms of sinus thrombosis are present.

Dr. Dench recalled a case seen last spring, in which a patient complaining of severe tinnitus had been subjected to a myringotomy. The drum membrane showed no evidence of any acute inflammatory process within the tympanic cavity. The patient developed a high temperature and a blood culture showed the presence of streptococci in the blood. Another otologist had arranged to operate upon the case at once. Owing to the absence of any acute aural symptoms, Dr. Dench had protested against operation, and the patient recovered, developing later a septic endocarditis, but which evidently did not result from the sinus thrombosis. The aural condition could at no time have been considered the primary focus of infection, as there had never been any acute inflammation of the ear. In this case the bacteremia and imperfect clinical history very nearly subjected the patient to a severe and unnecessary operation.

Dr. Guntzer said that while he had shown Dr. Duel numerous notes he had collected on the subject of bacteremia, they contained very little as to the diagnostic value of blood culture in purulent diseases of the ear. Lüdke's paper made it very plain that there is often a latent bacteremia which would not always give clinical manifestations. Dr. Oppenheimer, in the latter part of his paper, said that from a parietal thrombosis the circulating blood was supplied with microorganisms. That may be true at a late stage, for it seems from investigations that most thrombi are sterile, at least in the beginning, the infection thereof being a secondary process. Luberach examined some 215 vein thrombi in different parts of the body, and out of that number found only twenty thrombi which were infected. The point is that the bacteremia or the infection of the blood probably takes place when the inflammatory process has extended to the vessel wall and caused

an injury; the infection of the blood is really secondary to the phlebitis that begins to create the thrombus. Another very interesting point is that the old idea of thrombus formation by the coagulation of fibrin, etc., is changing. Some experiments have shown that the most likely cause of the thrombosis is a slowing of the circulation, and an injury to the vessel wall by an inflammatory process, and that the main constituents of the thrombus are the blood plaques which in all probability are an inherent part of the blood itself.

Dr. Dixon said that as the hour was late he would make his remarks as brief as possible, and confine himself to a report of the work at the New York Eye and Ear Infirmary during the past fourteen months.

During this time we have made 74 blood cultures in 60 cases of suspected sinus thrombosis. Of these 60 cases, 19 were positive, 1 doubtful and 40 negative. Fifteen yielded streptococcus pyogenes, 3 streptococcus capsulatus and 1 pneumococcus. This patient later died of lobar pneumonia and meningitis. (It seems probable that where we have mixed culture in the presence of a meningitis or a sinus thrombosis, if we find pneumococcus, we are liable to have to deal with a case of penumonia. We do not have positive cultures in meningitis alone.) Of the negative cases, there were 4 cases of meningitis, 7 doubtful cases of sinus thrombosis, 3 cases of erysipelas, 2 of perisinus abscess, 2 with symptoms of sinus thrombosis following radical operation, and one each epidural abscess, temporosphenoidal abscess, diphtheria, measles, intermittent fever, suppurative arthritis and pyelitis. In one case of sinus thrombosis, a blood culture was negative before resection of the internal jugular vein, a second was negative four hours after resection and a third was negative three days later; nevertheless the contents of the resected internal jugular vein yielded a culture of streptococcus pyogenes. The 14 comprising the balance of the negative suspicious cases were mastoids.

In two positive cases the blood cultures were found negative within twenty-four hours after operation. Dr. Oppenheimer has spoken of cultures from the canal. We never make them at the infirmary. We do not think it is worth while. We did for a time, some years ago, but found so many germs, and

it took so long to separate them that we now simply pick out the predominating organism, which can generally be done at once. It has been the rule to find the predominating organisms in the smears from the external auditory canal, those found in the blood culture, and those found in the contents of the resected internal jugular vein, to be the same. Our experience has shown the relative frequency to run: streptococcus pyogenes, pneumococcus, streptococcus mucosus capsulatus, instead of streptococcus pyogenes, streptococcus mucosus and pneumococcus, but the latter holds good in blood cultures.

Those who have been doing blood culture work have probably experienced some difficulty in keeping the culture tubes at proper temperature. A year ago I devised a water bath (here shown) with twelve tubes, closed at the bottom, which run to within about an inch of the bottom of the bath, the calibre being sufficient to accommodate the usual size culture tube. The case is made of copper, double sides and bottom, with a sheet of quarter-inch asbestos between, to prevent rapid radiation. There is a hole cut in the asbestos at the center of the bottom to facilitate heating. It is supplied with a thermometer and a vent for filling with water, also a handle sufficiently long to swing clear of the thermometer and culture tubes. This is very convenient for carrying around in the wards. We have found by experiment that it will lose one degree centigrade in ten minutes at the ordinary temperature of the room. In the winter time we simply leave it on the radiator, and that will keep it at 50 or 55° C.; when a blood culture is called for we take it off the radiator and allow it to cool down, or put in a little cold water. It cools off very slowly. Since I left the office with it this evening at 7:45 (it is now 11 o'clock) it has gone down to 37° C., and the tubes have just begun to jell. The proper temperature is 40 to 41°. At 41° the ordinary 1½ per cent agar is fluid. It has been very helpful to us, and we would not like to try to get along without it now.

Dr. Hays said that he merely wished to add a report of his blood cultures to those of Dr. Dixon in order to make the work from the New York Eye and Ear Infirmary complete. He started making cultures a year and a half ago, the work being later assumed by Dr. Dixon. He took forty-two

blood cultures. In these five were positive, two being taken on the same patient. The method used was the same as at the Mount Sinai Hospital. One positive case contained the staphylococcus aureus and four the streptococcus mucosus capsulatus. There was no case of pneumococcus infection. There were three cases of erysipelas. All of these cases resembled sinus thrombosis, but the surgeons were prevailed upon to wait for the report of the blood culture before operating. All of these cases were transferred to Bellevue Hospital. In six cases an operation was performed for sinus thrombosis before the report of the blood culture. In all of these cases no thrombus was found and the culture was reported negative. There were two cases of acute lobar pneumonia with negative blood cultures. There was one case of cavernous sinus thrombosis in which the culture was negative. The relation of the blood count to sinus thrombosis was rather interesting. The counts were usually low—from 9,000 to 12,000, with a moderate increase in the polynuclears. Whenever a high count was present it indicated some such complication as pneumonia. He had come to the conclusion that blood cultures were mainly valuable when taken with the clinical data and that it is mainly in the borderline cases that cultures are of any value. Negative cultures are of as much value as positive ones. With a clinical picture of sinus thrombosis and a negative culture, it is well to wait, taking other cultures if necessary, provided the case can be closely watched.

Dr. Seymour Oppenheimer said that there were many points he would like to refer to in closing the discussion, but the lateness of the hour demanded his being brief.

Dr. Gruening said that the blood culture was of no very great value in establishing a diagnosis, and that clinicians did not have to depend upon the laboratory for reaching their diagnosis. I agree with him that we should not be absolutely dependent on the laboratory, yet the blood culture as a definite part of the examination is, in my opinion, ofttimes a necessity. In many of the cases I have observed, the blood culture gave the clue to the diagnosis long before the clinical signs were evident, often antedating the latter by two or three days. In one case the laboratory reported five colonies of bacteria present to each cubic centimeter on one day and for five succes-

sive days a daily increase in the number, yet there were no clinical signs to warrant interference. My experience with the subject at that time was limited and I would not proceed until the clinical evidences were there.

Dr. Gruening also said he would operate even if the culture were negative. We all would if the clinical signs were present. We ofttimes operate before we receive the report from the laboratory. He refers to the fact that in his series of ten cases he had three negative cultures, yet he operated. These cases were among the earliest of the blood examinations made by Dr. Libman, and the technic was not well developed. Probably now with the method employed all ten cases would have had a positive report.

Dr. Duel said you may get a positive culture in many suppurative processes. I do not know why Drs. Libman and Celler arrive at such different conclusions from Drs. Duel and Wright. I am sorry Dr. Wright is not here tonight to help us solve the matter.

We have operated repeatedly on the sole strength of the blood culture, and have in every instance found a thrombus. When it happens that the laboratory says the culture is positive and the operative findings fails to corroborate the positive report, then I will begin to question its absolute reliability.

Dr. Duel also said a bacteremia may be present in many suppurative diseases. I mentioned in my paper that Drs. Libman and Celler, in order to confirm the Wright method, utilized the Wright method in sixty-six cases of suppurative diseases of a great variety other than otitic, and the results were uniformly negative.

Dr. Dench said that the blood culture diagnosis is simply corroborative, and an additional link in the diagnosis. Quite correct, but it may prove to be the master link, as for example in the case of a young woman admitted to the service at Mount Sinai Hospital on October 22d, the patient being transferred from another institution, with a very mild acute suppurative otitis and the additional diagnosis of a pneumonia. The pneumonia we failed to find, but a blood culture showed a bacteremia. Operation revealed a thrombus in the region of the jugular bulb.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON OTOLOGY.

December 9th, 1910.

A Case of Epilepsy Complicating Mastoiditis.

DR. H. B. BROWN said that he would speak informally of a case seen recently. A little girl, five years of age, was operated upon eight months ago for mastoiditis. The posterior wound healed, but the discharge still continued. Four days ago, when on the street with her nurse, her face suddenly "became red as a lobster," she became rigid and unable to speak or move, and had no feeling, as if she was going to fall. Has had six attacks in the last three days. Has this form of epilepsy, in this case, any relation to the mastoid operation?

DR. JOHN B. RAE reported in brief a case of

Sinus Thrombosis.

upon which resection of the jugular had been performed that day. The patient was a boy of about 16 years. He was suffering from an acute purulent otitis. There was a small degree of tenderness over the antrum. The appearances within the canal were significant rather of the otitis than of any mastoid involvement. Temperature, however, was 103° F. The patient was admitted to hospital and a paracentesis, a blood count and a blood culture ordered. The count showed a leucocytosis of 23,000 with 72 per cent polymorphonuclears. The blood culture was negative.

On simple mastoid operation the sinus was discovered close to the posterior wall. The inner table over the sinus was eroded for a considerable area, but the vessel itself gave no indication of the nature of its contents.

On another rise of temperature exploration of the sinus was undertaken. Another blood culture had been ordered, but the result not being known the sinus operation was decided upon from the clinical evidence alone.

Later, this second blood culture showed a positive streptococcemia.

This brief report is submitted to emphasize the fact that the blood culture, even in the presence of a septic thrombus, may prove negative and so help to mislead us in those very cases in which the finding of the infecting organism in the blood might be the factor which would determine operation. In the presence of adequate clinical evidence we should not wait for the blood culture; in doubtful cases with little clinical evidence a positive culture should determine operation. Negative culture is not evidence either way.

DISCUSSION.

DR. DENCH said that the discussion of bacteremia was interesting. He had recently performed a radical operation on a boy; four days later a rise of temperature occurred. The blood culture was negative. Forty-eight hours later the blood culture was still negative. The sinus was then exposed and opened by an assistant, and a thrombus removed. The next day the temperature went to 104° and the jugular was resected. After that, only one rise of temperature occurred. The blood culture was positive on the day after the jugular had been resected. He believes that negative blood cultures are of little value; positive blood cultures may be confirmatory, but not positive evidence of sinus thrombosis. As an aid to early diagnosis it cannot be depended upon. We do not need it to make a diagnosis.

DR. OPPENHEIMER disagreed with Dr. Dench's last remark, and believes that there are many cases where the clinical evidence is not sufficient without a blood report, and that blood culture is often necessary, and that a bacteremia is often demonstrated before positive clinical signs are present. Some cases of this kind were reported by him at the last meeting of the Section.

DR. DENCH asked if any of the cases were without "temperature."

DR. OPPENHEIMER replied that some of them were, and cited two whose temperature had not gone above 100°, in which no clinical evidence of sinus thrombosis was present, the blood culture being the determining factor. In one case 320 colonies of streptococci to each 1 cc. were present.

Paper: A Consideration of the Pathologic Conditions of the Ear Resulting in Profound Impairment of Hearing.*

By E. B. Dench, M. D.,

New York.

Paper: Educating the Eye to Substitute for Deaf Ears.†

By Edward B. Nitchie,

New York.

DISCUSSION.

Prof. John D. Wright (Wright Oral School for the Deaf, New York City) expressed his pleasure at being present at the meeting, and complimented Mr. Nitchie on his paper. He cordially recommended it to the thoughtful consideration of the medical profession. He was especially pleased with the emphasis laid by Mr. Nitchie on the "synthetic" instead of "analytic" method of training; the training in ideas more than in vision. The eyes usually perform their function in the act of lip reading better than the brain, and therefore mental training is even more essential than visual training.

Prof. Wright's principal work during the last twenty-two years has been the teaching of deaf children and young people of school age; teaching them to speak when necessary and to read the lips, and giving them the same education they would have received had their hearing been unimpaired; while Mr. Nitchie has devoted himself to the teaching of lip reading to adults. But, as Mr. Nitchie said in his paper, the two problems touch at many points and involve many of the same difficulties. The speaker said he felt that the gentlemen present wished definite facts that they could take home with them to use for the benefit of their patients when occasion arose. He therefore made four concise statements based on his own observation and experience during almost a quarter of a century.

First. Every adult too deaf to understand ordinary conversation under ordinary conditions can be greatly aided by training in the art of lip reading. Not every artist can be

*See page 54.
†See page 74.

a Michael Angelo, nor every mathematician a Newton, nor every lip reader a Nitchie, but every deaf adult can acquire a degree of proficiency that will be of much service and satisfaction in the social intercourse of daily life. Lip reading has its limitations, but any degree of proficiency is a clear gain and worth time and trouble to acquire. It is well known that the deaf have a tendency to withdraw from social intercourse and become lonely and despondent, and as a result they tend to make less and less use of the impaired faculty of hearing, which neglect in turn produces further impairment of the function. It has been Prof. Wright's observation that the acquisition of any degree of proficiency in lip reading leads to an increase in social intercourse, and owing to the fact that the catching of even detached and imperfect sounds through the ear enormously aids the brain in interpreting the movements of the lips, the lip reader uses to the utmost all his remaining power of sound perception. Unfortunately, most cases of deafness are progressive, and as time goes on the person grows deafer, but it has been Prof. Wright's observation that this progression is delayed by any increased ability to supplement the ear by the eye, owing to the greater amount of use in daily intercourse; for as long as the ear is able to catch any sounds of speech under ordinary conditions it will strain to do so, since it is unquestionably far easier to hear language than to see it on the lips.

Second. Children and young people who have been rendered deaf by illness or accident after some language and speech have been acquired, can, if promptly and properly treated, retain normal speech and continue their social and educational life with very little if any serious interruption. The speaker said he could not lay too much stress on the necessity for prompt action in these cases, for the change of method of perception from ear to eye can be made with much less effort if begun immediately after the impairment of hearing, and every physician knows with what astonishing rapidity speech deteriorates after deafness occurs unless the most prompt measures are taken to retain the normal reflexes. Expert attention should be given this matter even before there has been complete physical recovery from the illness or accident that caused the deafness. The old saying never is more true, "that an ounce of prevention is worth a pound of cure," than in the matter of speech change following impairment of hearing.

Third. Every congenitally totally deaf child, including those rendered deaf in early infancy, can be taught to speak and can be given the same degree of education by purely oral means without the intervention of any manual communication, as the normal child in the same condition of life and of the same degree of mentality; if stupid, in either case the education will be poor. Speech will lack the inflections and varying intonations of the hearing person, but can always be made intelligible to those thrown in frequent contact with the child, and generally to strangers. This training should be begun as early as the fifth year.

Fourth. All children and young people who still retain a little power of sound perception, though not enough to acquire speech and language normally through the ear, can have the brain trained to make use of the remaining imperfect faculty, either for the comprehension of spoken words or for the guidance of their own voices, or for both purposes. The apparent result of this mental training is an improvement in sound perception, but it is difficult to discriminate between an actual improvement in the function of the organ and an improved mental coördination. Even a slight remaining power of sound perception is a very valuable possession for a child, but one that requires much individual training to render it effective. For lack of the necessary teachers to give this individual attention there are hundreds of children in the schools for the deaf with a remnant of hearing that is potentially useful, but is never trained to be of use. The medical profession can exert great influence in all communities to improve these conditions by larger appropriations from the legislatures, and by more effective teaching in the schools. Résumé. It is true that all classes of those suffering from profound impairment of hearing, as defined by Drs. Dench and McKernon, can be greatly aided by proper educational treatment, and they naturally look to the medical profession for suggestion and guidance in the matter. It has been Prof. Wright's experience that very often it is not enough for the physician to give his patient general advice in this matter, or even specific addresses of people to consult, as they often neglect the matter and lose very valuable time. The most certain way of accomplishing what the physician desires is to himself communicate with some capable person and arrange

that, by printed matter or by personal letter or interview, the patient be educated to an understanding of the possibilities and necessities of the situation.

DR. MCKERNON said that Mr. Wright had covered the ground very thoroughly, but there were one or two points on which he would like to say a word. First: The point mentioned by Mr. Wright, the education of the eye to relieve the mental strain. We are at fault in not advising the taking up of lip reading early. He told of a case that had come under his observation, where a patient fifty years of age, and exhausted by prolonged mental attention, hears better to-day after having been educated by Mr. Nitchie's method of teaching. He gets sounds more easily without the mental effort. In another class, lip reading should not be started early, *i. e.*, cases with slight impairment of hearing, and ashamed of the defect. When hearing for conversation is twelve or fifteen feet, the patient should not be taught lip reading, because the faculty of hearing would be neglected.

In congenital deafmutes, ten years ago the age limit for education was too late. The training should be early; it cannot begin too early.

DR. DENCH said that his paper was simply a résumé of the subject, and by no means exhausted it. In reply to Dr. Whiting, he suggested the possibility of labyrinthine hemorrhage with the parotiditis. By profound deafness he meant when a patient cannot hear a loud whisper at five feet.

Replying to Dr. McKernon, he agreed that cases which hear fairly well but desire education or artificial aid should be discouraged. Lip reading is valuable in cases of excessive mental strain.

He disagreed with Mr. Nitchie and Mr. Wright in their belief that hearing will not deteriorate if neglected for lip reading.

In reply to Dr. Harris he said that changes in the labyrinth are similar to changes in the middle ear; in certain cases diagnosed as otosclerosis that diagnosis cannot be positively made. He recalled a case of apparent otosclerosis, in which the patient now has good hearing after treatment of the middle ear conditions. He believes that attempts at treatment should be made unless the diagnosis of otosclerosis is positive.

MR. NITCHIE, in closing, said that he believes in using the eyes and ears together. Some persons cannot read the lips when they hear the voice; they are confused by the voice. If such persons ordinarily hear the voice in conversation, they should be trained by special exercises to coördinate the two means of perception, eyes and ears, so that the two work together, each helping the other. Dr. Dench urged that the lip reader should be encouraged to use all the hearing he has. Mr. Nitchie said that is not only what he advises his pupils but also what he does himself in his constant practice. Most lip readers naturally use eyes and ears in coöperation; such pupils do not need special practice to develop such power, but they should be urged and advised not only always to use the eyes to help the ears but also to use the ears to help the eyes.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON OTOLOGY.

January 13, 1911.

Case of Gunshot Wound of the Mastoid.

DR. SEYMOUR OPPENHEIMER. CASE 1.—This patient was admitted to Gouverneur Hospital on the 11th of September, having been shot in the right ear by a 38-calibre bullet passing through the auditory canal and lodging in the mastoid process. There was much swelling over the mastoid region and auricle, but other than deafness there were no other symptoms present. Under local treatment the wound healed promptly and the edema subsided. The deafness, which was almost total by both bone and air conduction, has improved since the time of the injury. The radiograph presented shows the bullet in the posterior part of the mastoid process, and some small fragments around the main mass. There was no urgent reason for subjecting the patient to operation at the time of the injury, nor later, and up to the present time he has been disinclined to submit to operative interference on account of the absence of symptoms. The wound has healed, and the bullet is not palpable beneath the skin.

CASE 2.—G. R., age 25. Attempted suicide on May 25th by shooting himself in the head. The bullet entered the right ear. Brought to the hospital by ambulance. General condition on admission, good. Right facial paralysis. Bloody expectoration. Difficulty in swallowing. Serous blood escaping from the ear. Pupillary reaction equal. Swelling along right side of the neck.

Radiograph: Bullet seen in auditory canal, a fragment in the inferior maxilla, and another bullet along lateral pharyngeal wall.

From November 21st to November 29th the patient was in the general surgical service under observation, his general condition remaining good. Some bloody expectoration at times, and some dysphagia. Discharge from ear profuse and of a serous nature. On November 29th the temperature rose

to 104, and the patient became stuporous. W. B. C., 21,000; polynuclear, 92%.

On November 30th I was asked to see him. Patient extremely drowsy; large quantities of cerebrospinal fluid escaping from auditory canal, containing pneumococci. Facial paralysis present. Inspection of fundus as well as making of caloric labyrinthine tests prevented by the middle ear space being occupied by the bullet mass. Marked Kernig and Babinski. Reflexes present as well as tache cerebrale, and neck rigidity.

Operation.—The mastoid region was explored and bullet removed from middle ear, it being jammed tightly into the region of the aditus. The facial canal and semicircular canals were splintered, the two ends of the facial nerve being seen. From the semicircular canal a large quantity of cerebrospinal fluid was escaping. Over the cochlea was a large fistulous opening, through which a fragment of the bullet had passed. It is curious to note how this occurred without injuring the underlying carotid vessel. The temporal region was then exposed, and the dura was found to be extremely tense. Incision of same showed a marked congestion of the pia-arachnoid, with some hemorrhage, clots and lymph exudate. Rubber tissue drains were introduced in various directions in the subdural space, completing the operation.

The patient died two days later, with all the signs of an infective meningitis. Repeated lumbar puncture showed the presence of pneumococcus.

The specimen of brain presented showed marked pia-arachnoid congestion over the entire convexity, with areas of plastic exudate.

Gunshot Wound of Mastoid With Brain Abscess.

Dr. Seymour Oppenheimer said that as the patient was in custody he could not be presented. The young man, aged 20, had attempted to shoot a policeman some time in December, but the policeman struck his hand upward, and the revolver went off, the bullet entering his ear at close range. There was much swelling, and powder marks around the auricle, and the patient complained of severe pain in the head and eyes. His mental condition was good. Dr. Oppenheimer said that he did not see the patient until four days after the injury, at

which time a radiogram was submitted to him. The eyes had been examined, and there was a double choked disk. Dr. Oppenheimer presented the radiograms, and said that the one presenting a view from before backward, not being stereoscopic, was rather deceptive, as one would judge that the mass was not within the inner table of bone, but between the skin and the external plate. The lateral view showed a large mass situated in the mastoid, and also a smaller fragment lying across the roof of the tympanum. When these plates were submitted to Dr. Oppenheimer the patient's general condition was good, and he showed no signs of meningeal irritation. Dr. Oppenheimer argued that a bullet left in that position would undoubtedly before long give rise to either a meningitis or some sub- or extradural process, and operation was decided upon. The large mass of lead presented was found situated in the mastoid process, and the roof of the tympanum was splintered, and in the roof of the tympanum and amid the area of splintered bone was found the smaller specimen presented, which had perforated the dura. Upon removing this, three drams of foul-smelling pus escaped from the brain substance. The infection was of a saprophytic anerobic nature. The dural opening was enlarged, and a rubber tissue drain was inserted into the brain substance. The patient's recovery was uneventful, and he would have been presented, except for the fact that he was a prisoner. The radiographs were particularly instructive.

DISCUSSION.

Dr. Johnson (referring to the gunshot wounds of the mastoid region) said that the cases were most interesting, and that the amount of cerebrospinal fluid that in such cases sometimes flows from the cerebral cavity is marvelous. He recalled a similar case in which the bullet had lodged in the mastoid region and could not be removed through the canal, although it could be seen. It was necessary to move the ear forward and excise a considerable portion of the bone before the bullet was removed. There was no lead in the cerebral cavity, but there was a fracture, and a tremendous flow of cerebrospinal fluid followed. If the patient's head was turned to one side for a brief space, five or ten minutes, and then turned over, a dram of cerebrospinal fluid would be evacuated. That

condition continued for over two weeks, and as the flow gradually ceased the patient became very irritable, and it was feared that he was developing a meningitis; this, however, did not occur, and after a few days of excitement the man made an uneventful recovery.

In another instance a musician fired a twenty-two calibre bullet first into one ear and then into the other, the muzzle of the revolver being pressed into the ear canal, and it was remarkable how the bullets crossed in the cerebral cavity at the base of the brain without severing the arteries. The man had tremendous tonic and clonic spasms, and died in two days, it being impossible to do anything for him. The most remarkable thing was that he could shoot himself in one ear, the bullet passing through the brain, and then place the revolver in the other ear and shoot again. There were no powder marks visible on either side, showing that the pistol muzzle was in each instance pressed into the external auditory canal.

Report of a Case of Otitic Meningitis Presenting Some Unique Symptoms.

Dr. Seymour Oppenheimer. H. R., age 67, thirty years ago had a chancre, followed by secondary lesions, for which he received appropriate treatment. Has always enjoyed exceptionally good health. In the early part of April the left ear discharged, following an acute rhinitis, for which he consulted his physician, who found the auditory canal much swollen, the tympanic membrane perforated and the middle ear discharging copiously. After three weeks of irrigation treatment the discharge ceased. Shortly after, the patient developed an acute influenza, and the ear again began to discharge. For the subsequent weeks he was not under medical observation, the aural discharge ceasing.

About May 14th he again consulted his physician, complaining of severe frontal and temporal headache. No ear discharge. Temperature, 101.6. Two days later a swelling appeared above and below the ear, and the headache ceased. At this time I was asked to see him by the attending physician, Dr. Eugene Eising. Upon examination I found a marked edematous and infiltrated area about the mastoid region, extending well up over the zygomatic and temporal parts. Con-

siderable infiltration was also present along the neck, with marked lymph nodular swelling. The auditory canal was completely prolapsed, preventing a view of the canal fundus. Hearing for aerial conduction was almost absent. The left ear showed the existence of a marked sclerotic process with a total loss of hearing. The general physical condition of the patient was excellent, no suggestion of meningeal irritation being present. Urinary examination negative. Temperature, 99.2; pulse, 96; respiration, 24.

Diagnosis.—Acute mastoiditis with probable cortical perforation.

Operation May 17th. The usual curvilinear incision through the enormously infiltrated tissues was made, extending from the upper level of the ear to the tip of the mastoid process, one-fourth inch posterior and paralleling the retroauricular fold. A horizontal incision was also made, owing to the width of the mastoid process. The periosteum was well elevated, making a large exposure of the operative field. A perforation of the external cortex was found in the region of the suprameatal triangle, from which large quantities of pus escaped. A probe introduced into this perforation entered a large cavity. With the exception of the marginal edges of the perforation the balance of the cortex was extremely hard. The intercellular osseous walls were much necrosed, and large masses of granulation tissue and swollen pyogenic membrane and free pus were present. The entire cavity was thoroughly curetted, including the zygoma cells, the tip of the process being removed en masse. A very small area of dura was uncovered posterior and above the turn of the sigmoid sinus as well as overlying the anterior bony plate of the sinus, the bony covering in these vicinities being necrotic. The exposed vein wall appeared normal. Unfortunately the specimen of pus submitted to the laboratory for examination was not made.

The patient reacted well from the operation and was apparently in excellent condition.

Thirty-six hours later a chill occurred, lasting for seven minutes. The temperature rose to 106.2, the pulse to 138 and the respiration to 38. He then fell asleep, after speaking to the nurse, and upon his awakening in the morning an aphasia was noticed. An hour later, when I saw him, he was irrita-

ble and restless and was unable to speak. Temperature, 105.8; pulse, 140; respiration, 36. The presence of aphasia of course suggested a possible brain abscess, and the marked chill and rapidly following rise in temperature was suspicious of a sinus thrombosis. The mental irritability was not sufficient at that time to warrant the diagnosis of the presence of a meningitis.

The patient was taken to the operating room and the wound inspected, which appeared normal. A blood culture was taken, which was subsequently reported as negative. Lumbar puncture was also performed, and the cerebrospinal fluid was found to contain the streptococcus mucosus capsulatus. The polynuclear percentage was 96. About four drachms of fluid was withdrawn under a normal pressure. It was turbid and of brownish color. Temperature, 102.4; pulse, 140; respiration, 40. The pupils were equal and of normal reaction. The fundi normal, as well as the ocular movements. Left facial innervation slightly stronger than the right. Urine voided involuntarily. Owing to the inability to cause the patient to understand, the mouth and tongue were not examined. The upper extremities move equally well. The deep reflexes present. Both sides of thorax move equally well. Abdominal reflexes very light. Right cremasteric reflex diminished. Motility of both lower extremities normal. Both knee jerks increased. No Babinski, Mendel or Oppenheim signs present. Kernig marked on both sides. Some retraction of the head. Patient speechless and apparently unable to recognize what is being said, although he looks at one in response to speech understandingly, but attempts to elicit understanding of speech, either written or spoken, is futile. When asked if he wants to drink, when shown a glass of water, apparently in sign of recognition he nods his head. No response to noises. No muscular twitchings or tremors. White blood count, 28,800; polynuclear, 94%.

Operation, subdural drainage. Anesthesia, gas oxygen.

With the diagnosis of meningitis, the patient was taken to the operating room, and the upper end of the primary mastoid incision extended upward and forward through the temporal muscle. The underlying squamous plate of the temporal bone was rongeured away, making a large exposure of the dura of the middle cranial fossa. The dura was not

bulging appreciably and was pulsating. A large incision was made therein, and but a small amount of cerebrospinal fluid escaped. In making the incision through the dura a branch of the middle meningeal artery was severed, requiring ligating. The pia-arachnoid was much congested, but showed no evidences of exudate.

Three pieces of rubber tissue were introduced in different directions into the subdural space and the wound repacked and the patient returned to bed. A few hours later antistreptococci serum was injected into the cerebrospinal canal. During the day and night all the signs of meningeal irritation markedly increased, and further exploration of the cranial cavity was determined upon. Temperature, 103; pulse, extremely rapid and of poor quality.

Operation.—Conversion of simple mastoid into the radical and drainage of posterior cranial fossa. Gas oxygen anesthesia. With a broad-nosed rongeur the bony wall between the mastoid cavity and the middle ear was rapidly broken away, and the prominence of the facial nerve leveled down to allow of a thorough inspection of the middle ear spaces, the ossicles and membrana tympani being curetted away. No evidences of a fistulous opening, either over the roof of the tegmen tympani or in the region of the cochlea or semicircular canal, could be detected. An area of bone was then removed in front of the descending limb of the sigmoid sinus, between it and the posterior surface of the petrous pyramid. The bony excavation was then carefully continued along the pyramid, until the internal auditory meatus came into view. The dura was incised at this point and a drain of rubber tissue introduced.

The condition of the patient required much stimulation at this time, and an intravenous injection was given.

The operative shock was most pronounced, and death took place three hours later.

The points of extreme interest in the case are:

1. The undoubted existence of areas of cerebellar meningitis, present at the time of the primary mastoid operation, but with no recognizable evidences of the lesion.

2. The development of the aphasia, which is a very unusual symptom, in connection with an uncomplicated meningitis. This latter symptom is due to the fact that the temporal lobe

on the base has no known function, and, according to Starr, if the disease advances upward on the left side, a sensory aphasia may result.

Postmortem Examination.—The portion of the brain which appeared in the wound was dark red in color and hemorrhagic. Extending from and along the convexity from the upper portion of the frontal lobe to the occipital lobe there is a purulent inflammation of the meninges. In the upper portion of the postcentral convolution is a fairly extensive pial hemorrhage about 2 cc. in diameter. Also a productive inflammation of the meninges over the cerebellum (older than the process in pia over cerebrum). No abscess or hemorrhage in interior of cerebrum. Lateral sinus (left) shows a (left) recent non-adherent clot. Over frontal lobe pial vessels much congested and subpial extravasations along their course. Sections from fronto-occipital-temporal lobes show acute exudative meningitis.

Cases of Chronic Suppurative Otitis Media Showing Results of the Yankauer Operation.

Dr. Harold Hays. Case 1. This patient, a young woman, had had a chronic suppuration from the ear since childhood. When admitted to the clinic, there was a profuse discharge of foul mucopurulent material and granulation tissue, which did not yield to treatment. During the summer the Yankauer operation was performed, and two weeks later the discharge ceased. Six weeks later, however, it started again, and the patient was operated upon a second time, in December, with the assistance of Dr. Yankauer, when a number of fistulous tracts were found, and the drum was excised. Some of the adhesions were freed, and since then there has been only a slight discharge of mucoid material.

Case 2. This patient, another young woman, has also had a foul-smelling mucopurulent discharge since childhood. When admitted, granulation tissue was found, with some necrosis of the malleus and the incus. These were removed early in September, and the patient was allowed to wash her ear. The discharge, however, did not cease, and two weeks later the Yankauer operation was performed. After a time the discharge ceased, but later she had a slight return of the discharge. She was then operated upon a second time, but still the discharge did not cease. In December Dr. Yankauer

saw her, and some small adhesions were found near the oval window, which was free, and which helped her hearing. The tube was closed, and nothing further was done, and she now has only a few drops of mucus every few hours.

CASE 3. The third patient, a boy, came to the clinic during the summer with a profuse foul-smelling suppuration and three or four large polyps, which were removed in three or four sittings with a snare forceps. The discharge, however, continued, and four weeks later the Eustachian tube was curetted. The discharge continued for a week or two, but was not so foul-smelling or pussy; later it ceased for six weeks, and then again started up. At present there is only a slight thin mucous discharge every few days.

Paper: The Results of the Yankauer Operation in Chronic Suppurative Otitis Media.*

BY HAROLD HAYS, M. D.,

NEW YORK.

DISCUSSION.

DR. BRYANT spoke of Dr. Yankauer's instruments, which had been shown, stating that he considers them excellent and would certainly make use of them if he desired to close the Eustachian tube. Dr. Bryant stated that the paper of Dr. Hays had covered the whole field of chronic middle ear suppuration. But his own remarks would be confined to a few points in regard to the desirability of closing the Eustachian tube.

It is generally recognized that most middle ear and mastoid infection enters through the Eustachian tube. Hence a closure of this channel would be a method of prophylaxis against all such infection. There is, however, one objection to this prophylactic measure—the loss of hearing that it would entail, which is especially significant for those whose hearing is already damaged and who cannot afford to have it still further interfered with. Dr. Bryant's own experiences, without exception, have proved that in the case of middle ear suppuration the hearing of the patient is less if the tube is closed than if it is open. On closure of the tube, either by secretion

*See page 86.

or other obstruction, there was in many cases a decided loss of hearing; he could recall no case where opening of the tube was not followed by improvement in hearing.

The second point discussed was whether it is necessary to undertake this operation of closing the tube in order to avoid a still more dangerous procedure, i. e., the radical operation.

Dr. Bryant stated that he had frequently seen cases of recurrent tympanic infection, due chiefly to the infection reentering the tympanum per tubam. The cure of such cases was always permanent after proper nasopharyngeal treatment. In suppuration of the mastoid cells and antrum it does not seem that closure of the tube would be very effective. Treatment other than the radical measure for these cases can be found in draining the mastoid antrum and cells posteriorly.

With reference to Dr. Hays' statement that 80 per cent of cases can be cured without undertaking the radical operation Dr. Bryant stated that, according to his experience, 100 per cent of noncomplicated cases of chronic tympanic suppuration could be cured without operation and kept so permanently by nasopharyngeal treatment. In the majority of cases Dr. Bryant prefers nasopharyngeal treatment to stoppage of the Eustachian tube. Where the mastoid cells, rather than the tympanic cavity, are involved he advises postaural evacuation of the antrum and cells.

Dr. Oppenheimer said that the whole subject was still so new that every little mite one might add was worth submitting. He had used Dr. Yankauer's method in six cases, or rather in three cases, for in the others he had used the method as part of the radical operation. He had been in the habit of using a little conical burr, which he had picked up in one of the dental supply companies, to curette the Eustachian membrane, in order to get complete closure of the tube. It had occurred to him that Dr. Yankauer's instruments would better conform to the anatomic configuration of the tube and could be introduced deeper, so he employed them in two cases as a part of the radical operation upon the mastoid, and the result was a complete closure, although he and others had also gotten this closure almost always with other instruments. One colleague endeavored to obtain this result with the use of bichlorid 1/500, applied into the Eustachian tube, and had

succeeded in closing the tube in that way. There are, therefore, a variety of means at command whereby to obtain this result. In one of the six cases referred to a radical mastoid operation had been performed some three years previously, but the patient returned repeatedly with a small area at the bottom of the wound where some detritus had collected, and when this was removed there was some pus beneath. Dr. Yankauer's curette was passed quite deep into the lumen of the tube and a complete closure resulted. In the other three cases, which came more strictly under the discussion, two had suppuration of a chronic nature in which there was a perforation at the periphery of the drum, strongly suggesting nasopharyngeal disease. It had existed for many years, and sometimes would be dry, and then, following some infection, moisture would reappear. These were distinctly cases of nasopharyngeal infection, and in these two instances he employed Dr. Yankauer's method very effectively. Both cases were seen a week ago, three months after the operation, and they are dry. The third case was one in which there was a large destruction of the drum membrane with some necrosis of the ossicles and granulation tissue. In this instance the method had proved an absolute failure. As Dr. Bryant had said, much depends upon whether the condition is limited to the tympanum and dependent primarily upon some nasopharyngeal infection, or whether it is associated with some more extensive disease in the mastoid process; even in the presence of necrotic areas in the tympanum, where there is no disease in the mastoid, *i. e*, in cases that are dependent primarily on tubal disease, where there is a constant reinfection, on removing the source of infection, although the tympanic lesion may be quite marked, they may clear up by this method which prevents further reinfection. The method is most commendable in properly selected cases, but the type of cases should be carefully selected.

Dr. Rae said that Dr. Yankauer had been kind enough, just after presenting his cases at the section in May, to give him the opportunity to see him operate on two chronic suppurative cases. He immediately provided himself with an outfit and has performed the operation several times since. It is too early yet to speak of the end results of this procedure, but

one cannot but be favorably impressed because of the simplicity of the method as compared with the radical operation.

He agreed with the remarks of the previous speakers as to the proper selection of cases.

He had operated on both ears in a case of chronic suppuration in a girl of 16 years. The disease had existed since early childhood and there was no trace of ossicles in either ear. Within three weeks one ear was dry and has since remained so, but the other, though much improved, was still moist. Six weeks after operation the tube on this latter side proved to be closed on inflation. Two weeks later, the ear being still moist, inflation was again practiced and a small amount of air was able to be blown through.

Even when the operation has been carefully performed, it seemed to the speaker that reopening of the tube is possible and that it occurs in one of two ways. The immediate effect of the operation is the formation of a mass of granulation at the isthmus. As cicatrization of this mass proceeds there can be no guarantee, apart from the smallness of the space in which we are working, that the tube will remain occluded when shrinking is complete. The other possibility is that by infection from the nasopharynx the granulation mass may break down entirely. For these reasons it would seem wise to inflate, after a reasonable time, not only those cases which have failed to clear up but also the cases which have apparently cured.

Dr. Rae also said that, like Dr. Oppenheimer, he had used the Yankauer instrument to close the tube in the performance of the radical operation.

In reply to a question, Dr. Rae stated that there was no difference in the hearing in any of his cases. So far, however, he had only operated on cases of very long standing with considerable impairment of hearing. It should not be forgotten in this connection that practically all intermittent discharging cases hear a little better when the ear is moist than when it is cicatrized and dry.

DR. YANKAUER said that he had been very much interested in Dr. Hays' paper and in the questions which had been brought up. In his original paper it should be noted that the cases which got well quickest were those in which the mid-

dle ear was clear, and the cases which required the longest time were those where there was granulation tissue or cicatricial adhesions. That fact is quite in accord with the pathology of middle ear suppuration. The primary cause of all middle ear suppurations is a nasopharyngeal infection; the closing of the Eustachian tube will put an end to the infection from the nasopharynx, and the healing of the diseased process in the middle ear will depend entirely on the degree of disease present in the middle ear and mastoid cells. When the disease is slight and there is little or no bone disease and no exuberant granulations, there will result a rapid cessation of the discharge; some cases would no doubt be helped by intratympanic operations. In all cases, closure of the tube is necessary, whether done at the time of the radical operation or otherwise. The removal of adhesions of the drum membrane to the inner tympanic wall, of cicatricial bands, of disease in the attic, etc., which can be reached through the canal, will help in establishing a cure. On the other hand, in cases of profound disease in the mastoid cells it is hardly to be expected that a cure will be effected. Whatever cure is effected will have to be done by nature, for all that the surgeon can do is to keep the region clean and remove the products which interfere with drainage. Cases in which such conditions were present required considerable time before becoming dry. He did not consider six weeks sufficient time to establish a cure: some cases do not get well for a year and a half. One of his cases had continued to discharge for over two years; then the patient came under the care of a colleague, who did nothing for the ear, but who reports that it has now become entirely dry. So a cure is possible even after two years. Whether or not it is wise or justifiable to wait so long before doing the radical operation is a matter of opinion and individual judgment.

Dr. Bryant's argument interested him very much. In his observation, when the tubal orifice is filled with secretion the hearing is lost. That observation, which is entirely correct, does not apply to the case at issue, for when the tubal orifice is filled with secretion, it can be assumed that the lower portion of the tympanic cavity is also filled with secretion, and in all probability the notch of the oval window is not free to receive the sound waves; whereas when the Eustachian tube

is closed at the isthmus and the ear is dry, the sound waves can be reflected into the round window. In a number of his own cases, and in one of Dr. Hays', there was improvement in the hearing following the severing of adhesions which had obstructed the entrance of the sound waves to the round window. The condition is different from that presented when the ear is filled in its lower part with secretions. There has not been any diminution in hearing in any of his own cases; there has been no effect, one way or another, on any tinnitus which was present; it was not made better or worse in any of them, and no tinnitus appeared which had not existed before.

Another question is the selection of the cases in which this operation should be done. It is very difficult to decide that question at the present time. According to the usually accepted indications, whenever there is cholesteatoma there should be a radical operation, yet he has seen two cases get well by simply curetting the tube and waiting. Some operators would consider radical operation in the case of polyp formation; in cases in which polyps were present, he had removed as little of the polyp as he could in order to get at the region of the tube, and treated the remaining portion with applications of nitrate of silver; in several rather large polyps treated in this way he has seen them gradually get smaller and smaller, and finally disappear. At the present time it is not possible to decide which cases will get well by simply closing the tube and which will not; but it is conceded that even if the radical operation is done the tube must be closed, and if that is the case, nothing is lost by closing the tube first and waiting results; on the other hand, a good deal would be gained if the tube has been closed; for if it is already closed when the radical operation is performed we can expect a clean wound and better results. The question is: How long should we wait after the tube has been satisfactorily closed before we decide to do the radical operation?

Dr. Oppenheimer inquired if any of the members knew of any case where the carotid artery had been injured by Eustachian tube curetting. Every article on the subject of the radical mastoid which he had read advises extreme caution on account of the proximity of the carotid artery, and the presence of a possible dehiscence, yet he knew of no instance where any such injury took place from Eustachian instrumentation.

Dr. Oppenheimer said he understood that the case to which Dr. Whiting referred to was one where the chisel was driven into the carotid artery, and was not due to any manipulation in the Eustachian tube.

THE CHAIRMAN announced the presence of a guest whose name was familiar to all who attend the national meetings, and was also well known as the inventor of several useful instruments which most have found useful and necessary in operative procedures—Dr. Allport of Chicago, and invited him to take part in the discussion.

DR. ALLPORT said that he had not intended to take any part in the discussion, but could not refuse to say a few words in regard to Dr. Hays' interesting paper on Dr. Yankauer's operation. No one ought to discuss a subject unless he is familiar with it, and he was not at all familiar personally with the Yankauer operation, though he has great respect for Dr. Yankauer's judgment and ability and had seen the operation performed several times during his visit to New York in the last few weeks. He intended to try it when he got home, for one ought to try whatever holds out any promise of mitigating human suffering. Of course the operation will have to stand the test of time, like everything else, but it is a laudable effort to avoid doing the radical mastoid operation, and no one wishes to perform that operation if it can be avoided, because of the loss of time to the patient, the possibility of accidents, such as facial paralysis, or the possibility that after all the case will not be healed. It is true that such accidents are diminishing very much indeed as time progresses and the technic is improved. Almost all cases do well now.

Of course there are a number of procedures which have been promulgated for avoiding the radical operation. The so-called Heath operation, devised by Dr. Heath of London, evoked considerable enthusiasm at one time, and yet that has quieted down and few surgeons use it at the present time, though it may be useful under certain circumstances. Dr. Yankauer's operation seems to be the same sort of procedure, and we have to learn where it belongs. It is a useful operation and has doubtless come to stay for certain cases, but these cases will have to be carefully selected, for unless the cases are suitable the operation will be futile and will be dis-

credited. The cases which the operation will help are mainly those of tubal disease. Dr. Allport said that he had very little confidence that the operation would do good in cases of general middle-ear necrosis, or in cases of attic necrosis or antrum necrosis; it is not going to be a cure-all; but where disease gets in the cellar of the middle ear and comes from a tubal disease that secondarily produces certain lowered tympanic pathologic conditions, we may look for good results from it.

The question comes up, whether, even in a large proportion of these cases, good results will not be obtained by proper treatment of the nasopharyngeal space. The probability of injuring the carotid artery by this operation seems rather far-fetched. The instruments are well devised and prepared, are not vicious or harmful, and if used by one who has the delicacy of touch that he ought to have in any work of this kind the danger of injuring the carotid is remote; one can tell immediately by the sense of touch that he is on dangerous ground.

One use for the operation had not been mentioned this evening, but seems one which may prove of considerable utility in time—that is, in cases of uncured radical operation, where the discharge continues after the operation. In all such cases as he has seen, the disease has come from the tube; the other part is all right. When he does the radical operation he endeavors to not only curette the tube, scrape off the mucous membrane, but to absolutely scrape off the bone, so as to secure an absolute adhesive inflammation and close up the tympanic orifice of the Eustachian tube—he scrapes off the mucous membrane and bone as far as the isthmus. It seems probable that Dr. Yankauer's operation will prove very useful in these cases, and may be the finishing touch that is needed to cure the last pathologic condition.

One of the speakers had made a statement which he wished to challenge, when he spoke of the frequent occasions when the radical mastoid operation was performed and found to be unwarranted by the pathologic conditions. He has not seen many such cases in this country, though he has seen some in Europe, where he could not tell what they were operating for. In the cases he has seen in his own practice and in New York City, he has practically never seen an instance where the mastoid bone has been exposed that abundant evidence has not been

found for the operation, and where nothing else would have been effective. The Heath operation leaves untouched the attic, the very region that needs attention, and which after all is the center of the disease. He wished to emphasize the fact that almost all the cases in this country that are operated upon by conscientious surgeons, have first been submitted to proper treatment which has proved ineffective before the radical operation is resorted to.

Dr. Hays, in closing the discussion, said that in most of his cases he thought there was no appreciable difference in the hearing before and after the operation. They heard nothing before, and heard nothing after. In the fourth case the freeing of the adhesions allowed the girl to hear better. All would agree with Dr. Bryant that the nasopharyngeal conditions have much to do with the condition in the middle ear, and in those cases where there is not much necrosis or granulation tissue in the middle ear we ought to expect an excellent result from the operation. The argument has been brought forward many times that most of the cases that we do not operate radically would be cured if proper care were taken of the middle ear. He then cited a case in private practice where a patient had suffered from chronic discharge for years. This patient had been treated at various times for from six to eight weeks to three or four months, and the discharge decreased slightly; by that time the patient thought that he had done all that he could afford for the time and stayed away, and the discharge again increased. It is in such cases that will not submit to the radical operation, and where the discharge continues from year to year, that the Yankauer operation offers a chance of cure.

In the case of the failure reported by Dr. Oppenheimer, Dr. Hays said that he thought if the tube were inflated and found to be open at the end of six weeks, it might justly be thought there was some fault in the technic at the time of operation. He has tried to inflate cases and found he could get nothing through them; later he got some air through, but still later nothing at all. In considering these cases with some other men, they came to the conclusion that the reason it stopped for a few weeks was that the tube was actually closed with an acute inflammatory process which gradually subsided

and the tube again opened. It might be such a minute perforation, that simply passing the Eustachian catheter and blowing some air through, bubbles would come out in water which had been placed in the canal, and even such a small opening would keep up the discharge.

In regard to the cases in children which Dr. Page had spoken of, it would not seem wise to submit children to such treatment until the chronic nasopharyngitis, etc., had been treated by simple measures. The only thing he would claim for Dr. Yankauer's operation was that cases which had continued for many years were relieved by it. Children ought to have every chance given before resorting to this or more serious measures. In all probability it was not possible to attend to the ears as in an adult after the operation had been performed. The operation was not offered as a cure-all. In many cases where the radical operation ought to be performed, we are in an unenviable position when the patient returns and claims that he has been treated for some time and can get no promise of improvement, and yet will not submit to the radical operation; in such cases, even where it is suspected that the trouble may be in the mastoid, it is only fair to try the closure of the Eustachian tube.

There are really two classes of cases in which the operation is of great value; the first, where patients have suppuration from the middle ear on account of nasopharyngeal discharge coming through the ear and reinfecting it every time the nose is blown. In these cases the closing of the tube is the best thing possible to check the condition which would otherwise probably go on to radical operation. Then there are cases where for one reason or another the radical operation ought not to be done. Dr. Yankauer had reported two cases with pathologic conditions in the middle ear which got well after clearing up the conditions and closing the tube. That negatives the idea that closing the tube does not effect a cure.

In regard to performing the radical operation where the mastoid is not involved, we are liable to find some trouble in the attic, and then it is possible to get into the attic and clean it out pretty well, by way of the external canal, provided there is a perforation in the drum membrane. When we begin to clean out the mastoid we might find some eburnated bone which is very hard; we dig until we come to a very small

attic which communicates with the middle ear cavity as well as with the mastoid itself. It is in that class of cases that if we clean out the middle ear and attic and close the Eustachian tube we are liable to get good results.

The question could be argued indefinitely, but the point he wished to emphasize in his paper was that in this method we have a new procedure which should receive a fair trial; in the hands of those who have tried it, it has given excellent results, and where there has been failure it could often be accounted for by failure in technic, or in some lesion that had not received proper attention. It was with the hope of encouraging those to try it who have not yet attempted it, that he has presented the facts given in his paper.

NEW YORK OTOLOGICAL SOCIETY.

Stated Meeting, November 22, 1910.

DR. JAMES F. MCKERNON IN THE CHAIR.

PRESENTATION OF PATIENTS

Mastoid Operation for Persistent Pain in Mastoid Region.

DR. THOMAS J. HARRIS presented a patient whose history had been detailed by him at the last meeting of the society. The patient, a young woman, was under his care at that time for persistent mastoid pain and tenderness, for which an exploratory operation was proposed. The case evoked considerable discussion by the members of the socicety, and a further report was promised. The history was briefly repeated.

The patient, perfectly well in other respects, was seized last winter with very severe pain in both mastoids, the pain not being confined to the mastoid regions, but proceeding down behind the ear and up into the head. The ear presented nothing abnormal. The drum membranes were normal, there was no sagging of the canal and there was no temperature. The case presented every feature of one the symptoms of which would subside very promptly. The patient was put upon anti-rheumatic and constitutional treatment, and all the remedies known to the speaker for such cases. The symptoms increased in severity very gradually, and shortly after the May meeting of the society the patient was sent to the hospital. She was generally prostrated at the time, was unable to sleep and had the same pain behind the ears, extending into the canal, over the side of the head and into the occiput. An exploratory operation was advised, and the last of May or first of June the mastoid of one side was opened by the classical Schwartze operation. A considerable number of large pneumatic cells were found. These cells, unlike those of a case reported at the last meeting by Dr. Berens, were not filled with osteophytic deposits. The mastoid was thoroughly cleared out and the wound closed with the excep-

tion of a small drainage point at the lower part. This healed without discharge in ten days. The symptoms entirely disappeared except a little stiffness in the neck. There was more pain on the other side, and the patient insisted upon having the left mastoid opened. At the end of ten days this was done, whereupon almost the identical picture was found upon the left as had been previously found upon the right side. She was discharged in about ten days. Since that time there has been no pain whatever on either side until this fall, when she returned complaining of some pain in the mastoid region, or rather just above the mastoid. This disappeared entirely under constitutional treatment. The pain was not nearly so severe as that experienced before operation.

The case was an excellent one for primary closure of the wound. A large amount of bone was removed, and only the primary dressing was employed.

There was at no time any alteration in the hearing. The speaker felt fairly sure at the time of operation that he was dealing with a neurotic individual, and that virtually nothing would be found in the mastoid, but he felt justified in performing an exploratory operation. In looking over the literature of these cases he found the immediate results such as he had obtained, and that later on there was a recurrence of pain in some cases.

DR. GRUENING said the classical Schwartze operation consisted in the opening of the antrum. Dr. Harris had done more than that. The speaker called attention to a series of forty or fifty cases from Mount Sinai Hospital published in 1891, which had been very severely criticized in the *Archiv für Ohrenheilkunde,* the statement being made that the whole cortex should not have been removed. It would have been a mistake in the case presented not to have closed the wound. Dr. Harris did not present the case as a paradigm of those reported by Dr. Blake, who closes his infective cases. Dr. H. Knapp had published some cases in which the bone was a hard, solid mass, with no cells. He finally entered the antrum, which was small. Recovery followed the operation.

DR. HARRIS, in closing the discussion, accepted Dr. Gruening's suggestion that the operation performed in the case reported was not the classical Schwartze, as he had unwittingly

said, but the more extensive operation to which Dr. Gruening referred as having been performed in the series of cases mentioned.

Replying to Dr. Whiting's remarks, the speaker said operation was undertaken in this case with the greatest reluctance, and only after several weeks of treatment. Aspirin intensified the symptoms. The patient's physician saw her becoming a nervous wreck, with pain so intense that morphin was the only thing that would give relief, and operation was undertaken only as a last resort. From the standpoint that one does not know what is in a mastoid until one has looked into it, and that the operation, properly performed, is not a dangerous one, he would certainly proceed in a similar case just as he had in this one.

Result of Plastic Operation.

Dr. John B. Rae presented a patient to show the result of a plastic operation. The patient is a girl of 10 years, who six years ago underwent a simple mastoid operation on the right side. The postauricular wound did not close and has remained open in spite of two subsequent operations described by the parents as "scraping the bone."

When seen by the writer the patient exhibited a deep sinus behind the right ear. This was large enough to admit the tip of a finger, had no apparent communication with the aditus and was dermatized and dry. The opening evidently corresponded to the enlarged antrum, and examination of the roof of the cavity revealed the fact that the tegmen was completely gone and that the space was roofed in by exposed dura. The middle ear was dry and the hearing good.

Operation.—An incision was made from above to the edge of the middle point of the cavity, was then carried posteriorly around the margin of the opening to the middle line below and from there was carried directly downwards. The isolation of the cavity was completed by joining the two vertical incisions by rimming the opening anteriorly. The edges of the flaps were raised quite freely. The lining of the cavity itself was then very readily dissected out, coming away like the blind end of a glove finger and carrying with it an epithelial layer from the exposed dura.

The bone cavity showed a small black area posteriorly and

the whole exposed bone was freshened with a curette, no attempt, however, being made to establish communication with the middle ear. The whole field was then carefully cleansed and the cavity allowed to fill with blood from the margins of the flap. When coagulation was complete, the wound was sutured from end to end and a dressing applied. The wound was inspected from day to day and healed by first intention. The sutures and dressings were removed within a week and the result is apparently as good as it can be.

Three months later there is a very slight depression in the scar corresponding to the former cavity.

DISCUSSION.

DR. GRUENING asked whether, with the dura exposed and the cavity dry, it was absolutely necessary to scrape the dura and the cavity, and whether it would not have been possible to get a good result without the blood clot. He had obtained primary union without scraping the bone. The dura was not exposed in his cases.

DR. DENCH suggested an osteoplastic operation for the relief of these very depressed cavities. The soft parts are dissected out, and, with a small chisel, a quadrilateral flap of bone is taken from the mastoid opening, being divided above and below and left hinged in front.

Encephalitis Following Middle Ear Abscess.

DR. H. A. ALDERTON presented a patient whose history was reported at a previous meeting of the society. The patient, a boy 8 years of age, had been referred to him by Dr. Margulies of Brooklyn. One month previously an abscess had developed in the left ear, and since that time the boy had earache once or twice weekly. There was no discharge. The posterior superior wall of the canal was sagging; there was no pus in the canal; the drum membrane was congested and thickened; there was tenderness over three points of the mastoid, viz., the antrum, tip and posterior border; the temperature was 99 1/10, the pulse 94. The drum membrane was incised and irrigation and purgation ordered. The local condition did not improve, and four days later the usual mastoid operation was

performed. The bone was found to be full of cells containing pus and granulation tissue, especially the vertical cells under the mastoid antrum. The patient did well for two weeks, though he ran a temperature of between normal and 100° and at times complained of some headache. On the 30th of March he was suddenly taken with convulsive seizures involving the left side of the body and the jaw, nystagmus, horizontal and to the left, apparent paralysis of the right side of the body, and complete unconsciousness. The temperature was 100 2/5°, pulse 100 and respiration 26. This condition followed an attack of severe headache, and lasted from 12:45 p. m. to 2:30 p. m., when he was taken to the operating room.

At the second operation the dura was exposed over the mastoid antrum superiorly and over the sinus and cerebellum posteriorly. The dura was merely congested. After recovery from the anesthetic the convulsions and paralysis disappeared and the patient was in much better condition, though still complaining of headache. The temperature was 100 4/10°, pulse 84 and respiration 24. The headache, with restlessness, continued to manifest itself during the following days. On April 5th the patient complained of nausea, but did not vomit; on the 11th he was drowsy and heavy all the afternoon; on the 14th he was nauseated and vomited. On the 15th the temperature became subnormal—97°—pulse 50-60, respiration 26. There was suppression of urine for twelve hours, and constipation. About 4:30 a. m. he had a severe spasm and was unconscious for about half an hour. Upon recovery of consciousness the pain in the head was just as severe as before. Involuntary urination, another period of unconsciousness, and a continuation of subnormal temperature and pulse marked the next few days. On the 20th the patient became conscious and more comfortable, complained of hunger on the 21st and 22d, and had good nights. Pulse and temperature returned to normal, and from this time on he progressed to apparent complete recovery.

Blood examinations at the time of the first operation showed polynuclears, 78%; leucocytes, 15,187; hemoglobin, 83%. March 31st, polynuclears, 81%; leucocytes, 18,382; hemoglobin, 79%.

Urinalysis, March 15th, showed specific gravity, 1028; trace of albumin; indican very excessive; occasional casts.

Remarks of the pathologist: "Marked intestinal fermentation and mild parenchymatous irritation." On March 31st the specific gravity was 1012; no albumin present. Remarks: "Aside from the low urea percentage and specific gravity sample is practically normal."

Report of oculist, April 15th, was as follows: Oculomotor muscles normal in action; pupils respond normally. Right eye: Retinal veins rather too full and slight tortuosity of some of the arteries. Nothing significant. Left eye: A suggestion of optic neuritis; a beginning optic neuritis.

The patient was seen by a neurologist on April 15th and the diagnosis made by him was brain abscess, not localizable. Operation was recommended and refused.

From that time on the patient's condition improved, no further symptoms having appeared. He has had some trouble with his eyes, but he has improved in every way. The wound is more disfiguring than usual because it was kept open on account of the exposed dura. A wet bichlorid dressing was employed.

DISCUSSION.

DR. DENCH asked to what Dr. Alderton attributed the improvement, and whether he considered the condition one of serous meningitis. He cited a case which came under his care two years ago. The child was *in extremis* when first seen by him, and he refused to operate. The meningeal symptoms continued, the patient became blind and deaf. The Babinski sign was present at the time. He operated five weeks later, exposing a considerable area of the dura over the temporosphenoidal lobe and cerebellum. The temperature fell the next day and the child made a complete recovery of sight and hearing.,

One ordinarily supposes that exposure of the dura does not decompress the brain, but he was inclined to think that if the decompression operation were done more frequently there would be a larger proportion of successes in these cases.

The speaker agreed with Dr. Rae that removal of the bone may compensate for the pressure.

DR. RAE suggested the possibility of there still being a latent abscess present in this case.

DR. ALDERTON, in closing the discussion, said he was inclined to think the condition one of encephalitis. If it had been serous meningitis, as suggested by Dr. Dench, there would have been more tension than existed in this case.

Replying to a question by Dr. Gruening as to whether the bone was diseased, the speaker said the bone over the temporosphenoidal lobe was affected.

In response to a question by Dr. Harris concerning lumbar puncture, Dr. Alderton said none was made. He had operated as a last resort, and it was after this that the subnormal temperature and pulse developed. The patient was then seen by the neurologist, who made the diagnosis of brain abscess, and further operation was refused.

The nystagmus was horizontal toward the side affected. He had not examined the patient as to high tones, as suggested by Dr. Whiting.

Typhoid or Malarial Fever Mistaken for Mastoid Abscess.

DR. WILLIAM COWEN gave the history of a girl, 12 years of age, who had spent all but the last six months of her life in Arabia, and who, when he first saw her, was suffering from acute otitis media. Her temperature was 104°, there was no mastoid tenderness or bulging. He was called in consultation on account of the temperature. He decided to wait. The next morning the temperature dropped to 102°, running up again to 104° in the afternoon. He then decided to operate. He removed the cortex, and explored the tip, but found nothing. Two days later the temperature rose again, and for two weeks it had been fluctuating between 102° and 104°. The case was then gone over medically, and the spleen was found to be excessively large, extending below the free border of the ribs. The condition was supposed to be either typhoid fever or malaria, but there could be got no evidence of the plasmodium, and the Widal test was negative. No blood culture was made. The temperature evidently had nothing to do with the mastoid, and the case illustrated the importance of not being hurried into surgery until the symptoms are more compelling. He had never seen a spleen of that size in a septic case.

Temporosphenoidal Abscess Complicating a Chronic Purulent Otitis Media, With a Septic Temperature Range as the Only Symptom of a Diseased State.

DR. ROBERT LEWIS, JR. Mary McN., æt. 8 years, was admitted to my service in the New York Eye and Ear Infirmary on December 25th, 1909. The aural history of her case was as follows: There was an acute purulent inflammation of the right middle ear, complicating scarlet fever two years ago. A polypus was removed from the middle ear in March, 1909; this was followed by a cessation of the discharge for a time. The otorrhea reappeared in September and lasted until ten days previous to her admission to the infirmary, when it suddenly ceased. One week previous to her admission to the infirmary the patient complained of a severe pain in the ear, accompanied by headache. This continued up to the date of her admission into the hospital.

Examination of the patient on admission showed a normal condition of the heart, lungs and kidneys. The temperature was 102° F., the pulse was 108, the respiration was 26.

The external auditory canal was so stenosed as to prevent a view of the drum membrane. Evidences of a subperiosteal abscess were present and tenderness over the mastoid process was very acute.

Operation.—The subperiosteal abscess was evacuated, and a small cortical perforation was found in the mastoid process. The antrum was filled with a cholesteatomatous mass. The radical mastoid operation was performed. Following the operation the temperature was below 101.2° F. for the next eight days; on the tenth day it rose to 102.4° F. and on the twelfth day it rose to 105.2° F. During the next nine days rose on four occasions to between 104° and 105.2° F.

The morning of the twenty-second day after the operation it fell to normal and remained below 99° F. until 8 p. m. of the twenty-fourth day, when it began to rise and reached 105.2° F. at 4 a. m. of the twenty-fifth day. The rise of temperature was preceded by a chill.

During this time she was seen by Dr. Walter B. James and Dr. Walter Lester Carr, the consulting physicians of the infirmary. They could find no lesion to account for her variable temperature.

The patient had no headache, no drowsiness, no stupor; on the contrary was very bright, even when awakened from a

sound sleep. The eye grounds were normal, and the reflexes were normal. Widal test was negative. No tubercle bacilli were found in the stools. Smears from the aural discharge showed a mixed infection. January 15th the blood culture was negative.

Blood Count.	Jan. 5th.	8th.	12th.	17th.
Red B. C.	4,800,000	4,800,000	4,000,000	4,020,000
White B. C.	25,200	7,400	16,000	8,200
Small Mononuclear	7.5	16.	9.4	35.2
Large Mononuclear	2.5	6.	2.6	7.6
Transitional	0.	1.8	1.0	.6
Polynuclear	89.5	75.8	87.	56.
Eosinophile	0.	.2	0.	.6
Mast cells	.5	.2	0.	0.

On only two occasions was the pulse slower than seemed compatible with the temperature curve.

On January 18th she complained of slight headache. She was weak and emaciated. There was no symptom of a definite lesion in any organ, nor of a general dyscrasia. Except for the temperature the girl would have been sent home. The wound had done well with the exception of a small area in the upper posterior portion of the excavated mastoid cells. This area was about the size of the diameter of an ordinary lead pencil and would not cover over with granulations and looked dark. I determined to explore this point, so on January 18th I reopened the wound and explored the bone in the vicinity of this dark area. As I went further into the bone the dark area increased in size, and as I entered the middle fossa there was a gush of pus. The opening in the bone was enlarged and about three ounces of foul pus was evacuated. The abscess cavity extended fully two inches into the brain substance, measuring from the dura upward, inward and backward. The cavity had well-defined walls. It had ruptured through the dura mater, but a plastic lymph around the opening confined it to a limited area.

Following the operation the temperature never rose above 100° F. except on February 6th, when it rose to 103° F. for a short time.

I believe the abscess which was found had been present for some time and that the radical operation had kindled into

action a latent process. Of course the fact that the abscess had well defined walls made the chances of recovery infinitely better.

I used a rubber drain for 24 or 48 hours and after that depended entirely upon a gauze drain.

The patient made a rapid recovery.

Late Mastoiditis Following Scarlet Fever With Perisinus Abscess and Sinus Thrombosis.

DR. H. A. ALDERTON presented the history of a girl, 6 years of age, who had been ill for forty-nine days following the inception of an attack of scarlet fever. She was admitted to the Kingston Avenue Hospital on November 1, 1910. Her general condition was then very poor, she was markedly emaciated and poorly nourished. The body and soles of the feet showed a scarlatiniform desquamation. There was a patch of unorganized membrane on the left tonsil, no discharge from the nose and no conjunctivitis. The left ear was normal; from the right ear there was a profuse bloody discharge; the drum membrane was almost entirely gone; the manubrium was present. The soft tissues of the right mastoid were swollen, reddened and tender, with projection outwards of the auricle. The heart sounds were muffled; the first sound was not of good muscular quality; the second pulmonic and aortic sounds were slightly accentuated; the rate was irregular There was no appreciable enlargement of the heart. The percussion note of the lungs was normal; breath sounds normal; no rales heard. Abdomen and extremities normal. Glands of the neck were palpable. The pulse was irregular and of poor tension. Urine negative; throat culture negative. For two days following admission her temperature ran from 99 4/5° to 100 2/5°; pulse 104 to 124; respirations 26 to 28.

Operation upon the right mastoid, November 3, 1910, showed the bone to be in a condition of dry necrosis from tip to antrum, except for an area posteriorly directly over the sigmoid sinus, where the cells were broken down and the cavity formed contained thick offensive pus which pulsated. Exposure of the sigmoid sinus, by following up the pus tract, disclosed a perisinus abscess lying far down toward the bulb of the jugular; pus was also escaping from a perforation in the outer wall of the sigmoid sinus just above where it begins

to turn inward and downward to reach the bulb. Enlargement of the opening in the sinus wall, and careful probing of the caliber, showed either an organized thrombotic occlusion above or an agglutination of the sinus walls, or both; below the sound failed to reach the bottom of the abscess cavity within the sinus. Because of the poor general condition of the patient, ligation of the jugular was not attempted, especially in view of the apparently walled-off character of the sinus abscess and the absence of clinical signs of systemic infection.

The condition of the patient had steadily improved since the operation, and the mastoid wound was healthily granulating except for a small area of exposed bone within the antrum. This would probably need curettage to living tissue.

The only reason for reporting the case was as an example of late mastoiditis following scarlet fever, and that two days previous to operation the temperature gave no indications of sinus involvement.

Improvement of Symptoms in Spite of Presence of Pathogenic Bacteria in the Blood.

DR. SHEPPARD called attention to a case now under the care of Dr. Stickle and himself at the Jewish Hospital, Brooklyn. The patient, a man 40 years of age, came into the hospital three weeks ago complaining of pain in the ear. There was only slight mastoid tenderness, but a thickened, reddened condition with bulging of Shrapnell's membrane were noted. Tympanic cavity comparatively dry on incision of the membrane. Douching was at once resorted to, and the temperature fell to 100°, varying during the next three days from 100° in the morning to 104° in the afternoon. The mastoid tenderness immediately disappeared. A blood culture was taken, on which, for some reason, no report was received for several days, announcement finally being made of the presence of large numbers of the bacillus streptococcus mucosus capsulatus. In the meantime the temperature (always taken per rectum) suggested the diagnosis of typhoid fever. No positive Widal reaction could be obtained. Before the blood culture report was received the patient's condition had improved so much that it was decided to wait for another culture to be made. Report upon this was to the effect that there were more germs in the blood than were found with the first culture. The man was

feeling so well that he wanted to go home, but he was kept in the hospital much against his will. Blood counts were made every day, the last one showing seven to eight thousand leucocytes, and 63 per cent polymorphonuclears. The germs are still in the blood and the patient still begs to go home.

DISCUSSION.

DR. DENCH said the case was a unique one. All such cases in the New York Eye and Ear Infirmary had died in spite of operation.

DR. GRUENING emphasized the importance of considering the clinical symptoms and not depending entirely upon the blood culture. At Mount Sinai Hospital the physicians are in touch with the otologic department and they know the symptoms to which sinus thrombosis gives rise. In the class of people who come to the hospital for treatment the ear symptoms are ignored for a time until additional symptoms appear. The ear may not discharge any more, but the patients may have chills and fever, when they are admitted to the medical ward. The physicians would make the diagnosis of sinus thrombosis from the history and clinical symptoms, and not rely solely on the blood culture. So if the medical men make these diagnoses it is because they have the benefit of the otologic service and know the symptoms of sinus thrombosis. In some of the European papers it has been stated that in America no operation for sinus thrombosis is made until the result of the blood culture has been ascertained. In a series of cases which the speaker had reported, he distinctly stated that he did not wait for the blood culture. If the clinical symptoms are positive and the blood culture is negative he would operate. A positive blood culture may be of much significance in obscure cases without definite clinical symptoms.

DR. DUEL considered the presentation of the cases of Dr. Sheppard and Dr. Whiting to fairly represent the position held by most otologists with reference to bacteremia. In one case the patient had a suppurating ear, with clinical symptoms which showed him to be in a serious condition; examination of the blood showing the presence of bacteremia; the whole evidence leading to operation for sinus thrombosis, with re-

covery of the patient. In the other case there were no clinical symptoms, and the mere presence of bacteremia had not warranted an operation. A number of cases had been reported by him and others in which cultures had revealed bacteremia. Despite this fact there had been no clinical symptoms of sinus thrombosis, and the patients had recovered without operation. In other cases there had been evidences of bacteremia, with clinical symptoms of sinus thrombosis; operation had been performed, and the patients had recovered. In many cases where bacteremia is present, where the thrombus occludes one of the smaller veins, the patient can combat the systemic infection himself without operation. The clinical symptoms in such cases are evidences of whether or not the patient is combating the condition successfully. Bacteremia is undoubtedly present in many cases where sinus thrombosis has not taken place. It is fair to suppose that bacteria are in the vein long before thrombosis occurs. Inflammation of the vein wall is necessary for clot formation, and this is caused by the presence of bacteria. These may be swept into the circulation before any clot is formed. While a bacteremia when present may usually be demonstrated by the removal of, say, ten cubic centimeters of blood from the median cephalic vein of the arm, this amount might not be sufficient to show its presence, while removal of twenty cubic centimeters (or five hundred, if this were practicable) would demonstrate it. A certain amount of bacteremia is bound to occur in any suppuration. If the infection causes a sufficient amount of inflammation to lead to a phlebitis resulting in the formation of a clot, and this subsequently breaks down, throwing large numbers of bacteria into the circulation, the patient may be overwhelmed; then the necessity of operation arises. In the case reported by Dr. Sheppard, where the bacteremia was not sufficient to cause clinical symptoms, the speaker saw no reason for operating.

Dr. Kenefick recognized Dr. Whiting's case at Mt. Sinai Hospital as the woman on his service at the New York Eye and Ear Infirmary, who was removed from the infirmary as a case of pneumonia. The patient had had ear trouble for almost three weeks, for which she had used camphorated oil, but the structures in the fundus presented no evidence of involvement of the mastoid or of the lateral sinus. Just as he was about to operate on account of the sleepless nights and the three

weeks of acute middle ear suppuration, the patient was taken from the infirmary.

DR. SHEPPARD, in closing the discussion, added that a short time before the patient came under his care he had had some intranasal operation in the dispensary. He still had pus in his nose when he entered the hospital, and there was room for doubt whether the infection had taken place from the nose, through the ophthalmic veins, or through the lateral sinus. This had been a deterrent factor in the matter of operation.

Answering a question by Dr. Haskin the speaker said the vaccine treatment had not been employed. In consultation with the pathologist concerning the matter, the latter stated that the germ was one of a low order of vitality, that the leucocytes were taking care of it, and that in such cases vaccine treatment is contraindicated.

ABSTRACTS FROM CURRENT LITERATURE.

I.—EAR.

The Third Contribution to the Etiology of Otosclerosis.

CORNET (*Revue Hebdomadaire,* February 12, 1910) reports 18 cases of otosclerosis where a complete examination has been made and some modification of the normal nutrition observed. This takes the following forms:

Arteriosclerosis, eight cases;
Gastrointestinal autointoxication, four cases;
Atonic gastrointestinal intoxication, two cases;
Hepatic insufficiency, one case;
Renal insufficiency, one case;
Renal insufficiency with alcoholic indigestion, one case;
Successive pregnancies added to chronic gastrointestinal toxemia, one case.

Excluding the eight cases of arteriosclerosis there are ten cases of true otosclerosis, all of which present some modification of the normal function of nutrition. As a result of his study of these cases it is the author's opinion that in otosclerosis, with rare exceptions, there is a modification in the elimination of the chlorides. *Harris.*

Results of Autogenous Vaccine Therapy in Acute and Chronic Middle Ear Suppurations.

S. J. KOPETZKY (*New York Medical Journal,* October 15, 1910) has treated fifteen cases of suppuration of middle ear with autogenous vaccines. The results obtained by the treatment in these cases is as follows:

Of the six cases of chronic suppuration with bone lesion improvement was shown in one case and no result in the other five. In the five cases of chronic suppuration without bone lesions there were four cures and one case of improvement, while all four cases of acute middle ear suppuration were cured. The author concludes:

"It is obviously impossible to draw final conclusions from so small a number of cases, but because they were selected

to represent groups of middle ear suppurations, the results thus far obtained are worthy of note. The uniform failure to effect any results in the cases with bone lesions was logically to be expected. The study has, on the other hand, shown that autogenous vaccine therapy has a field of usefulness in otology in properly selected cases; that is, among such where the subsidence of bacterial activity means the end of the lesion. In acute cases, after the period of violent onset and its coexisting constitutional reaction has subsided, the added immunity acquired through vaccine therapy seems to rapidly cure the diseased ear." *Harris.*

Intervention Upon the Jugular Bulb.

MOURE (*Revue Hebdomadaire,* March 19, 1910). This includes intervention with opening the bulb, lavage from the sinus to the jugular vein, drainage, curettage and tamponing. Any of these measures can in certain cases give good results. They can be regarded, however, as only superficial measures, and where they do not succeed a thorough exposure of the bulb is demanded. This has been performed in a number of ways. Chipault was the first to perform it. Later Jansen and Grunert practiced it, while Voss in 1904 proceeded by the mastoid route and not the external method by the base of the skull as did the others. Ivanoff in 1903 operated in a similar manner, following the sinus down to its juncture with the bulb by removal of the lateral wall.

Moure concludes as the result of his observation in a recent case that the best method consists in having no absolute method, but to allow oneself to be guided by the lesion present and what one finds. In this way one will be led sometimes to open the bulb through the anterior wall and other times through the posterior. He regards pulsation of the walls of the sinus as pathognomonic of infection therein.

After completing work upon the sinus as low down as possible it is his custom to let 24 or 48 hours elapse; if the pyogenic phenomena persists, then opening of the bulb is called for.

Finally it must not be forgotten that anatomic difficulties are not wont to be met with in a patient suffering from disease in this part. *Harris.*

A Case Presenting Meniere's Symptoms Along With Facial Paralysis.

BRUCE AND FRASER (*British Journal of Laryngology*, August, 1910) give a table of the various conditions which may give rise to Meniere's symptoms. Meniere's disease is an apoplectiform occurrence of Meniere's symptoms and is usually attributed to hemorrhage of the labyrinth. Almost all cases reported have been cases of leukemia.

Their patient was a man of sixty-five, who was under observation for some time. He died from fatty dilatation of the heart and pulmonary tuberculosis. A diagnosis was made of neuritis of the facial and auditory nerves in the internal auditory meatus. Hemorrhage in this situation was also mentioned as the probable cause of the symptoms. A careful microscopic examination was made of the left inner ear and auditory and facial nerves. The result of this examination was as follows:

The inner ear was almost normal; there was no hemorrhage in the endo- and perilymphatic spaces of the cochlea, vestibule or canals; the membranous labyrinth was also almost normal as was the spiral ganglion; the neuroepithelium of the utricle, saccule and of the cristæ ampullarum was well preserved. In the lower turn of the cochlea Corti's organ was absent or degenerated. The mucous membrane of the middle ear was normal.

The functional examination made at the time of admission showed the case to be one of chronic progressive labyrinthine deafness. *Harris.*

Aural Tuberculosis in Children.

WILLIAM MILLIGAN (*British Journal of Laryngology*, October, 1910), speaking from a large experience, believes that aural tuberculosis in children is far more frequent than is usually supposed. About 20% of hospital children under six years of age suffering from purulent otitis media owe the origin of the disease to an underlying tubercular infection. Contrary to the usual view, he does not think that primary tuberculosis of the ear is rare. An uninfected tubercular discharge from the ear is thin, watery and for the most part odorless, containing white or gray granules. The chronic type of the disease is much more common than the acute. Disease of the underlying bone occurs at an early stage. Pro-

gressive cario-necrosis leads in time to the exposure of the dura mater and adjacent structure. The loss of one or more of the ossicles is wont to occur. The early enlargement of the periauricular glands is peculiarly characteristic of primary tubercular otitis media.

The channel of infection by means of which the bacteria enter is a varied one: through the ear, lymphatics, blood vessels, perforated drum membrane. The most common route is by way of the respiratory system, but the author feels that the importance of ingestion tuberculosis is underrated and urges a careful investigation of the milk supply, his theory being that the bacillus is swallowed with the milk and that regurgitation of the food so common in children forces a portion of it into the tonsil crypts, nasopharynx and neighborhood of the Eustachian tubes while the regurgitation and suction movements of the child carry the bacilli towards the tympanum. The symptoms are: Painless onset, absence of inflammatory reaction, frequent presence of one or more perforations, early appearance of enlarged periauricular glands and facial paralysis. When pyogenic infection has taken place the discharge becomes purulent.

The diagnosis is not always easy to make. The finding of the bacilli in a discharge from the ear is difficult at all times. A more certain method of diagnosis is the examination of portions of tufts of exuberant granulation tissue from the depths of the tympanum. More exact and reliable still is the inoculation of guinea-pigs with portions of bone or granulation tissue. In place of this more elaborate method results can be obtained from the Von Pirquet reaction.

Prognosis is poor. Early and thorough operation is advocated, even to the extent of the greater portion of the ear. Children suffering from tubercular otitis media should be segregated and every effort used to raise their powers of resistance. *Harris.*

II.—NOSE.

A New Method of Operating on the Hypophysis.

FEIN (*Wien. klin. Wochenschr.*, No. 28, 1910, p. 1035) proposes to enter the body of the sphenoid by going first through the maxillary sinus. A typical Luc-Caldwell is done, the eth-

moid cleaned out, the posterior end of the septum removed and the sphenoid opened. He has several times operated on the cadaver without difficulty. *Horn.*

Ethmoidal Neurosis.

KILLIAN. The anatomy, physiology and pathology of the first branch of the trigeminus are carefully reviewed. He strongly recommends, in all cases of nasal asthma, in vasomotor disturbances, hay fever and neuralgias having their origin in the ethmoidal nerve, the simultaneous cauterization, with trichloracetic acid or chromic acid, of the four points which are always affected, viz.: The tuberculum septi on both sides and the regions just above the anterior end of the inferior turbinates. The results in some cases of hay fever last through the entire season or may have to be repeated once. In severe cases, where the local cauterization fails, he recommends the division of the stem of the ethmoid nerve in the orbit. An incision is made as for the Killian operation, but through skin and periosteum. The latter is then raised up down to the nerve, and the nerve together with the artery and vein, are cut through. The bleeding is easily controlled. In the discussion many cases were cited where the operation had been carried out with great benefit. *Horn.*

A Case of Primary Tuberculosis of the Nose.

SEYMOUR OPPENHEIMER (*New York Medical Journal*, June 11, 1910). The patient was a man of thirty-four, who had suffered from nasal obstruction for a number of years. For this he had undergone numerous operations. When seen by Oppenheimer there was a perforation of the septum. The defect was filled with a mass completely obstructing the nares. The nasal septum was enormously thickened. Apparently the growth was attached to the septum. It was not very vascular, rather pale and friable. In appearance it resembled papilloma, while the septal enlargement was indicative of chrondroma. Microscopic examination showed giant cells and tubercle bacilli. The growth was removed by a Rouge operation. Three years afterward there had been no recurrence.

Harris.

Visual Fields in Accessory Sinus Disease.

A. MORGAN MACWINNIE (*New York Medical Journal*, August 13, 1910) has carefully studied the visual fields in five cases of disease of the accessory sinuses. As the result of this investigation he makes the following conclusions:

"1. The central visual acuity may or may not be diminished, although it is usually lessened.

"2. Normal visual fields without scotoma would indicate imperfect perimetric chart, hasty procedure, or indifferent taking of the same.

"3. The absence of pus in the nose, with or without proptosis, does not indicate a normal sphenoid.

"4. Relative scotoma for red or white are always present, regardless of whether the blind spot is enlarged or not.

"5. Contraction of the field of vision always for red, may be for white.

"6. Scotomata disappear before the field enlargement takes place, following operative procedures." *Harris.*

Four Complications and Two Deaths Following Probe Punction of the Antrum of Highmore.

CLAUS, Berlin (*Passow and Schaeffer Beiträge*, Bd. IV, p. 88). The operation of washing out the antrum for diagnostic purposes is a matter of such routine procedure that one often loses sight of the fact that it can be accompanied by serious accidents quite apart from the skill of the operator. The report of the following four cases comes to us with somewhat of a shock and warns us to be ever on the alert for any symptom which would indicate approaching trouble.

1. Air Embolus, Following a Washing Out of the Antrum. —A girl of 19 years, who five years previously had been radically operated upon, returned to the clinic complaining of headache. The old nasal opening had closed and a Lichtwitz needle was, on account of the great thickness of the bone, jammed with considerable difficulty into the antrum. Pressure on the bulb of the syringe gave evidence by the sound of the outcoming air, that the needle was properly in place. Suddenly the bulb resisted the pressure of the hand, and in that instant the patient became dyspnotic and had a feeling of anxiety. There was a distinct facial cyanosis. The pulse was 75 and full. The patient was placed on her back, the clothing

loosened and in about 10 minutes the cyanosis and dyspnea disappeared. A feeling of constriction in the chest lasted for several hours.

Claus can explain the case in no other way than by assuming that after the needle had entered the antrum it was accidentally withdrawn so that the point lay in the spongy bony tissue of the thick nasal wall. When the syringe was pressed a bubble of air entered an open vessel and the attack resulted.

2. Apoplexia Cerebri During Washing Out of the Antrum.—A man 68 years old, who had been under treatment for a long time, fainted suddenly, while the antrum was being entered from the inferior meatus. He was immediately admitted to the hospital, where it was noted that he had already developed a paralysis of the right arm, but that the right leg was intact. The patient did not react to a needle point, either on the right or left side. During the night the patient was uneasy; when spoken to he gazed in an uncomprehending manner and could not answer questions. The next day his mind was clear and he was able to recognize his physicians and seemed to recognize common objects, but was unable to give their names. His speech was thick and articulation very poor. The right arm could be moved a little, but the movements of the right leg had become worse. In six days the symptoms of the paralysis had entirely disappeared. The attack is explained not as an embolus or bleeding of the internal capsule, but as a cramp of a blood vessel in that region brought about by the use of the novococain solution.

3 and 4. Sudden deaths following washing out of the antrum in two cases.

A. A cotton tampon containing 6 drops of novocain (10%) and 3 drops of adrenalin was laid for 20 minutes in the inferior meatus. After washing out the antrum in the ordinary way the patient became faint and cyanotic. Various methods of resuscitation and stimulation were used, but in a few moments the patient was dead. The autopsy showed nothing of consequence. The cause of death was given as paralysis of the heart.

B. The second case, a woman of 36, was anesthetized like the first. The punction was made without difficulty. A little air was blown through, and the patient suddenly collapsed into a deep comatose state. As a result of the artificial respiration

and stimulation the condition of the heart improved somewhat, but toward evening grew worse again. The patient died without recovering consciousness. The autopsy showed numerous hemorrhages in the substance of the heart muscles and gray matter of the cerebrum and cerebellum. The only explanation possible was to assume a poisoning from the novocain, although the same procedures had been carried out many times on these patients, and thousands of times on others, without such results. *Horn.*

Immunization Treatment of Hay Fever.

SCHEPPEGRELL (*Revue Hebdomadaire,* February 19, 1910). Hay fever is not caused by a special pathogenic germ, but by a vegetable pollen which acts as a physicomechanical irritant on the mucous membrane of the eyes, nose and throat. The symptoms that result do not depend upon the absorption of the pollen, but upon the simple inflammatory reaction, upon troubles of respiration due to the irritant and upon the general effect on the nervous system.

This pollen in a large majority of cases proceeds from the ragweed. So direct is the connection between the pollenization of the ragweed and hay fever that it is possible to predict to a day the appearance of the fever in a given case.

Before the treatment is undertaken the nose should be put in as normal condition as possible. In 15% of his cases such treatment has been prophylactic.

A study of the phenomena in a given case shows that nature develops tolerance, which is slight at first and is soon overcome by the irritation, but increases rapidly, and by the end of the second week counterbalances the irritation, and by the end of the fifth week the majority of patients are relatively comfortable. The object of the treatment is to develop an artificial tolerance to the irritating pollen before the beginning of the attack and thus to establish an artificial immunization. This immunization is not permanent. Treatment must not be abandoned before the arrival of the hay fever season. For the treatment the author employs two teaspoonfuls of the male flowers in a piece of sterile gauze, in this way making a sack which the patient carries to the nose and agitates gently; this permits the pollen to escape. At the end of ten treatments the irritation diminishes considerably. The flowers must be

changed from time to time. The male flowers of the previous year are the best.

Sufficient time has not elapsed to demonstrate the method in a large number of cases, but so far the results have proved encouraging. The simplicity and economy of the method commend themselves. *Harris.*

The Radical Operation for Chronic Maxillary Sinusitis With Local Anesthesia.

DENKER (*Archives Internationales de Laryngologie,* July-August, 1910) up to recently has not believed in doing the radical operation on the antrum under local anesthesia; now he makes use of this method exclusively and with uniformly good results. Half an hour before the operation he uses an injection of morphin. The buccal mucosa is then swabbed with a 10% solution of cocain with adrenalin. Novocain and adrenalin are used in the following proportions: One part novocain to 100 gr. of normal salt solution, to which is added eighty drops of 1/1000 adrenalin solution. The needle is introduced a little above the first premolar tooth. The solution is carried forwards and backwards, filling all the adjacent area. Then it is introduced under the periosteum in the lower border of the orbit. Finally by means of the finger externally as a guide the needle is carried through the soft parts of the cheek and from one to two cm. of the solution introduced into the region of the nerve. A 10% solution of cocain is placed in the inferior meatus, and after ten minutes the operation is begun. Upon the exposure of the antrum a fresh injection subperiosteally is made in the lateral wall of the inferior meatus, and the lining membrane of the cavity is backed with a 10% solution of cocain. Altogether from ten to twelve cm. of the solution are employed. *Harris.*

Pathogenesis of Perforating Ulcer of the Nasal Septum.

SCHIFFERS (*Revue Hebdomadaire,* April 23, 1910). Such an ulcer should be called more exactly round ulcer, or simply ulcer of the septum. It is situated on the anteroinferior portion of the septum. Where an ulcer is irregular, it is no longer simple, but of syphilitic or tubercular origin. The most common cause is an infarct. This is difficult to demonstrate, because the ulcer can be preceded by an arterial liga-

ture constituting a distinct morbid entity. There is no ground for the theory of congenital origin. Tuberculosis is to be excluded as well as a syphilitic origin. A bacteriologic origin is claimed by certain authors, among them Hajek, Weichselbaum. It is true that staphylococci and streptococci are found in the ulceration, but they are usually found in the healthy nose, and so cannot be regarded as indications of the disease. Schiffers inclines to the pathogenic origin, therefore, because of the presence of the infarct in the great majority of cases.

Harris.

Consideration of the Pathogenic Theories of Ozena.

JOUTY (*Archives Internationales de Laryngologie*, May-June, 1910) considers, in order, the various theories which have been advanced for ozena. The atmospheric theory of Freudenthal he believes has some truth in it. He attaches no importance to the theory of metaplasia of the epithelium nor to the view of Cholewa that it is of osteomalacic origin. He believes that some weight should be attached to the theory of Zaufal that ozena is due to excessive enlargement of the nasal fossæ. The results obtained in the treatment of atrophic rhinitis by submucous injections of paraffin cannot be regarded as sufficient proof, inasmuch as paraffin acts as a foreign body modifying the atrophic condition where it is found. Little weight, in his opinion, is to be attached to sinus disease as the cause of atrophic rhinitis. The ozena usually begins in infancy when the sinuses are not developed. In the nose, where the ozena is most marked, the mucous membrane is atrophied, while in the sinuses it is hypertrophied. Finally treatment of the sinuses is attended by a cure, which is not true of atrophic rhinitis.

Syphilis and tuberculosis as etiologic factors have not sufficient proofs in their favor. A specific infection the author regards as the most probable cause of ozena. Perez, of Buenos Ayres, has done extensive work in this direction.

He divides the infections into four categories:

1. Cases of human contagion originating in the family.
2. Cases of human contagion not originating in the family.
3. Cases of probable canine contagion.
4. Cases of undetermined origin.

Various men have claimed to have discovered the bacillus.

That discovered by Perez has attracted the most attention. Cultures of this bacillus give the characteristic odor of ozena crusts. When, for example, a dog is inoculated with this culture, there is produced a reaction of the mucous membrane, with abundant thick, yellowish green discharge and crusts. Perez has observed complete atrophy of the turbinals in a rabbit infected with his bacillus. The confirmation of these observations of Perez is necessary before a positive statement as to their value can be made. Finally, the author considers the trophoneurotic theories. Delacour believes that ozena forms part of the adenoid syndrome consecutive to atrophic troubles due to modification of the thyroid function. He groups appendicitis, inflammation of Waldeyer's ring and ozena, and believes that they are all marked by the presence of adenoid tissue. Ozena is a local trophoneurotic manifestation, most often fetal in origin, which appears soon after birth or has for its development additional infection, such as diphtheria or scarlet fever.

Higguat has called attention to the relation between ozena and the affection of the thyroid. After the removal of a goitre a case of atrophic rhinitis in his hands entirely cleared up.

The author advances the opinion that ozena can be due to dystrophy, caused by trouble in the function of certain of the internal gland secretions, and reports two cases of ozena in young girls, in one of whom, after the establishment of menstruation, and in the other after marriage, all the atrophic symptoms disappeared.

An argument against the infectious theory of Perez is the inability to cure ozena by any known form of antiseptic. Further, the successes obtained by the submucous injection of paraffin are hard to reconcile with the infectious theory, while they tend toward confirming the neurotrophic theory, as does the success recently reported by Mermod in cases of unilateral ozena by simple correction of the nasal septum.

Harris.

III.—PHARYNX.

A Few Facts Concerning the Cause of Failure in Adenoidectomies.

J. VERNON WHITE (*New York Medical Journal*, September 3, 1910) places especial emphasis, as possible cause, failure to recognize:

1. "The peculiarities in shape of the space on either side of the rostrum of the sphenoid bone;

2. "The location of the fossa of Rosenmüller and its relation to the orifice of the Eustachian tube;

3. "The condition known as Thornwald's disease."

"An adenoidectomy properly done must, therefore, remove vegetation from these localities or at least positively exclude their presence there. It must exclude Thornwald's disease or properly treat it if present. With these precautions results will become more satisfactory. Only then will the promises of complete cure so emphatically made before operation be corroborated by the local and constitutional improvement of the patients in every case. Failure heretofore so common will be a thing of the past." *Harris.*

The Nasopharyngeal Origin of Chorea.

DE PONTHIERE (*British Journal of Laryngology*, September, 1910). As the result of a large experience, the author is convinced of the great frequency of the rheumatic origin of chorea and the equally frequent nasopharyngeal source of the rheumatism. By the removal of this source of intoxication formed by the tonsils or adenoids he is wont to obtain prompt and lasting success in the treatment of this condition.

Harris.

The Radical Tonsil Operation.

TENZER, Vienna (*Wiener klin. Wochenschr.*, No. 27, 1910). It is surprising, with all that has been written in America about the radical tonsil operation, that until now nothing of general value has appeared in the German press concerning this subject. Tenzer seems to have a thorough grasp of the subject, and furthermore is fully acquainted with American literature. The bibliography at the end of the article is one of the best that the reviewer has yet seen. The ball was started rolling at the last International Congress, when Welty, of

San Francisco, operated, at the Vienna Clinics of Chiari and Hyak, several cases of tonsils. The ease with which the operation was carried out greatly impressed the local men, and great enthusiasm has since been manifested in the matter.

Tenzer gives to Robertson the credit of the first important description of the present radical operation. The article appeared in the *Journal of the American Medical Association* in 1903. The historical development both here and abroad is carefully worked up, and especially the clear relation which exists between tonsillar disease and other diseased conditions in the body is for the first time plainly stated. He, however, still holds that the large hypertrophic tonsil is a protective expression on the part of the organism and that its radical removal is not necessary.

His method of operating is the same as most of the modern American methods, but he uses local anesthetics exclusively and does not even mention the advantages of the general anesthetic. The most interesting part of the article is his original investigations on the blood supply of the tonsil, and the illustrations are very valuable. By injecting the external carotid with Teichmann's mass he came to the following very important conclusions:

The following variations in the blood supply of the tonsil are found:

1. The arteria palatina ascendens has its origin from the external carotid, and at a level with the tonsil gives off the tonsillar artery.
2. The arteria palatina ascendens may branch from the arteria maxillaris externa.
3. The arteria tonsillaris may branch directly from the arteria maxillaris externa.
4. The tonsillar or ascending palatine may branch from the lingual.
5. The tonsillar artery may branch directly from the external carotid. In this case the branches may be multiple and very large.
6. The external maxillary artery sometimes makes a strong bend upward to a level with the tonsil and can easily be injured.
7. The same condition can take place with the lingual.

Stress is laid on the fact that the tonsillar artery can pass

directly into the capsule or can run in a tortuous condition on the surface of the pharyngeal musculature before entering the capsule. When such a condition exists the danger of injuring a vessel is ever present, especially if sharp instruments are used in the dissection.

His final conclusions are as follows:

1. A tonsillectomy is indicated in: (a) Every case of purulent tonsillar disease in adults, where the tissue does not project between the pillars, and where there are recurrent attacks of quinsy. (b) All cases of prominent tonsils of this type where conservative measures have failed.

2. In comparison with other operations the radical enucleation of the tonsil has overwhelming advantages.

3. The operation must be only carried out in a hospital.

Horn.

Congenital Insufficiency of the Palate.

A. Brown Kelly (*British Journal of Laryngology*, June-July, 1910) has made a careful study of this condition, based upon 19 cases which have occurred in his practice. He defines congenital insufficiency of the palate to be a congenital affection in which the soft palate does not effect the physiologic closure of the nasopharynx from the oral cavity and rhinolalia aperta results.

There are two varieties, submucous cleft palate and muscular insufficiency.

The most important of the conclusions which he makes are the following:

"Submucous cleft palate is characterized by the presence beneath the intact mucous membrane of a notch or gap in the posterior part of the hard palate, and the imperfect union in the middle line of the muscles of the two halves of the soft palate, also by a shortening of the hard and soft palate."

"In submucous cleft palate the epithelial coverings of the palatal processes have united across the middle line, but development has been interrupted before the mesoblast contained in these processes has also effected a meeting."

"A submucous cleft palate may be sufficient or insufficient, according as rhinolalia aperta is absent or present."

"The conditions in submucous cleft palate which determine sufficiency or insufficiency are: The length of the hard and soft palate, the degree and mode of elevation of the soft pal-

ate, the depth of the pharynx, the degree of prominence of Passavant's cushion, and the amount of approximation of the palato-pharyngei."

"Congenital muscular insufficiency of the palate is characterized by imperfect elevation of the palate during phonation, owing to defective or abnormal muscular action."

"In congenital muscular insufficiency there are no signs of interrupted development, such as are associated with submucous cleavage of the palate, e. g., notching of hard palate, nonunion of muscles in middle of soft palate, bifid uvula, shortness of hard and soft palate."

"The probable cause of congenital muscular insufficiency of the palate is the defective or unequal development, or abnormal disposition, of the muscles of the soft palate. The occurrence of such conditions is known anatomically, but their relation to the disease under discussion has not yet been proved."

"The insufficiency in submucous cleft palate is due to the palate being too short or too far from the posterior pharyngeal wall; the insufficiency in congenital muscular insufficiency is due to neither of these causes, but to the weak and ineffective action of the levators of the palate."

"The speech is similarly affected in both varieties of congenital insufficiency of the palate, but while in submucous cleavage there is simply rhinolalia aperta, in muscular insufficiency certain of the letters may also be imperfectly formed."

"The absence of regurgitation in all of the cases proves that deglutition can be satisfactorily performed with a palate which is either too short to reach the posterior wall of the pharynx, or in which the muscular action is insufficient to bring it into contact with the posterior wall of the pharynx."

"The ears are affected in nearly 80% of all cases; in submucous cleft palate the complications are more frequent and more severe than in muscular insufficiency."

"Functional rhinolalia lasting for months is the only affection likely to be confused with congenital muscular insufficiency of the palate; consideration of the history of the case will allow a distinction being drawn."

"The prognosis in children in slight cases is favorable; some make a perfect recovery. Marked cases and adult subjects may be improved, but a considerable degree of rhinolalia aperta usually persists."

"The best treatment is probably Gutzmann's method of massaging and stretching the soft palate." *Harris.*

IV.—LARYNX.

Radium Therapy in Cicatricial Stenosis in the Laryngotracheal Tract

CANTAS (*Archives Internationales de Laryngologie,* May-June, 1910). Laryngostomy has acquired a definite place in the treatment of cicatricial stenosis of the larynx and trachea. The proper method for the subsequent dilation is still under dispute. The French school advocate the so-called rubber dilation, which operates rapidly, but more painfully. Others are in favor of a dilation by means of a gauze tampon, a slower but less painful method. The Italian operators favor a tampon of wood. Each method has something to be said in its favor, but they all require many months, repeated dressings and are wont to be complicated with severe bronchial pneumonia, and relapses are not impossible.

Whatever the method employed to secure dilation, the aim is to obtain new tissue in the laryngotracheal tract, the walls of which no longer show any inflammatory reaction. For this purpose and based upon the remarkable results obtained elsewhere in the body, the author regards radium as the most promising agent to be employed.

Wickham and Degrais have made use of it for the removal of cicatrices and state that while it did not seem in their hands to have any beneficial effect upon certain cicatrices, the most unexpected results were obtained on others. The most important result was the return of the tissues to their former suppleness.

The form of the application of the radium will depend upon the particular case. It can be applied either in the form of compound radiation or ultrapenetrating radiation. In the former method most of the rays are allowed to pass through, while in the latter a sheet of metal is used to intercept all but the ultrapenetrating rays. A sheet of paper arrests the secondary radiation. The entire tube is enclosed by a thin layer of rubber to protect the apparatus from organic liquids.

For the purpose of reaching cicatrices in the larynx and trachea an O'Dwyer tube will serve admirably. According

as the full or partial radiation is required, the radium will be placed upon the tube, outside or inside.

Two conditions may be met with: Either the larynx or trachea is slightly stenosed with its lumen still free, or there is complete stenosis with no lumen present. In the former case, after laryngostomy has been performed, the author recommends the use of the ultrapenetrating radiation, the object to be secured being the specific action of the radium rays and not their destructive action. The tube is charged with 0.05 cg. of sulphate or bromide of radium and placed in position for twelve to forty-eight hours. Three or four weeks later, according to the result, the application will be repeated once or twice. In the interval the treatment will be the application of a simple O'Dwyer tube covered with one or more thin layers of gutta percha and left in position for one or more hours each day.

The second form met with is where intubation is impossible. Here also the application of the radium would be preceded by laryngostomy. With a partial or total removal of the cicatricial tissue or simple incision, great care must be taken not to wound the healthy cartilage below. If only a part of the cicatricial tissue has been removed the compound radiation is preferable; in that way both the specific and destructive action of the radium rays are secured. If, however, all the cicatricial tissue has been removed the specific action of the radium alone is required. Finally the two methods can be combined. Where it is desired to destroy excessive cicatricial tissue the O'Dwyer tube will be covered outside with a cloth charged with radium of an activity of 500,000. This will be left in position for two hours at a time, the treatments separated by several days. An intensive reaction of the cicatricial tissue takes place, with the production of an eschar which falls off toward the end of the sixth week, showing a red surface which, after eight or ten weeks, becomes a smooth and regular cicatrix. During the interval dilation with vaselinated gauze can be employed.

The method of choice, in the author's opinion, is the combination of the compound radiation and the ultrapenetrating radiation. The major part of the cicatricial tissue is destroyed by the more intensive action of the radium, while the ultrapenetrating rays will act upon the part remaining.

Although lacking actual experience, the author is exceedingly optimistic of the results to be obtained. He feels that the length of the treatment will be decidedly shortened and the resulting tissue will be smooth, supple and nonexuberant, permitting the re-establishment of the normal function of the larynx. *Harris.*

Paralyses of the Recurrent Laryngeal Nerve.

BROECKAERT (*British Journal of Laryngology,* March, 1910). This elaborate paper, presented at the Section of Laryngology of the Sixteenth International Medical Congress, has been abstracted in English by K. Dickerson.

Of the many points brought out in this abstract the following are the most important:

1. *Recurrent Paralyses of Cerebral Origin.*—"As the result of the combined experience of different authorities, it has been found that the center which controls the movements of the vocal cords in the dog is placed symmetrically on both sides of the median line, exclusively or predominantly in front and below the precrucial fissure. Without being able to deny that there are cortical centers which have an influence alone on the abduction of the vocal cords, or those upon which barking depends, their existence is, however, far from being demonstrable."

"Since even the most extensive destruction of the cerebral laryngeal centers only suppresses the voluntary movements of the vocal cords, leaving unaffected the reflex mobility, it is logical to conclude that absolute immobility of a vocal cord in the cadaveric position can on no account depend on a cerebral lesion."

2. *Recurrent Paralyses of Bulbar Origin.*—"The localization of a laryngeal center in the medulla is not yet established quite exactly." "A case of syringomyelia with laryngeal paralysis, which we owe to the kindness of Schrötter, proves that the ambiguous nucleus in man constitutes a laryngeal center. In opposition to Semon's law, there are numerous observations of recurrent lesions of bulbar origin, in which it is noted that the constrictor muscles were alone affected."

3. *Recurrent Paralyses of Peripheral Origin.*—The reasons which led Semon to formulate his law are given, and the author then proceeds to examine critically the position. As

the result of his investigations he regards it proven that the trunk of the recurrent is a mixed nerve, which contains in a single bundle almost all the motor nerves of the larynx as well as the motor and sensory nerve supply of trachea and esophagus. The author has confirmed Krause's experiment of separating the recurrent nerve in a dog and subjecting it to moderate and continuous pressure, obtaining in this way immobility of the vocal cord near the median line, but he does not regard this experiment as comparable to the results of slight and progressive pressure, which is observed pathologically. Experimental elimination of the posticus muscle by extirpation does not in a single instance show the cord fixed in the median position. Even if it is true that in the cadaver the postici can lose their contractility more quickly than the other muscles of the larynx, it does not follow that in the living subject the abductor group is in a manifestly inferior condition. The incessant activity of the posticus muscle, on which rests, during quiet respiration, the maintenance of the opening of the glottis, may explain its more rapid loss of vitality post-mortem.

The most rigorous anatomopathologic investigations do not give any arguments in favor of Semon's law. In the rabbit atrophy of the nerves is wont to attack first the external thyro-arytenoid. In all the cases which have been reported, including four of the author's, the recurrent was found embedded in a mass of glands, and the destructive process had gone on to the complete disappearance of the organic part of all nerve fibers and the loss of the function of conduction. The atrophy was always found to be of the same degree in all muscles supplied by the recurrent.

A study of recurrent paralysis clinically shows three stages, one of motor paresis, with progressive diminution of the motor abductor movements, a second showing the cord in the median position. This position in a great number of cases, while more median than the so-called cadaveric position, is removed a certain distance from the median line. "The characteristic symptom of this stage is the sudden change of voice; this sudden hoarseness rapidly becomes transformed into a bitonal voice. Dyspnea is rarely met with at the commencement of paralysis of the recurrent of peripheral origin; even attacks of suffocation or crises of paroxysmal dyspnea appear quite ex-

ceptional." In the third stage the recurrent has lost its conducting power, and the corresponding vocal cord rests in the so-called cadaveric position. "As far as the motor fibers contained in the recurrent are affected in their functional activity, the muscles of the larynx become less and less capable of contraction; this state of the nerve is shown in the laryngoscope by a progressive diminution of the movements of the vocal cord. The lesion attacks, in the same degree, all the nerve fibers, whatever be the muscles which they supply; the gradual loss of trophic influence, stimulating or exciting, occurs, therefore, in the same proportion in the abductor and adductor fibers. But, thanks to the soundness of the ary-arytenoid and cricothyroid muscles, the action of which is added to that of the adductors, thanks to the dynamic superiority of the constrictors over the dilators, it is the respiratory excursions which appear, from the commencement, to be the most limited; it is easy to understand that adduction will still be carried on with a certain amount of energy when abduction will have become very difficult, even almost impossible."

"To explain the immobility of the vocal cord, whether in the median line or quite near the median line, a distinction must be made. When the vocal cord is immobile and placed exactly in the median line, this exceptional position must be looked upon as the effect of a contracture, depending either on a direct peripheral irritation of the nerve trunk or on a reflex irritation. This irritation stage of the recurrent is generally wanting in cases of simple slow and progressive compression of the nerve; it may be observed, above all, in the course of neuritis of the recurrent nerve."

"As regards the immobility of the vocal cord in a position more or less approaching the median line, this is the expression of a deep-seated change, but still incomplete, in the nerve. In fact, at a given moment, the dilator muscle, much paralyzed, becomes incapable of still acting on the vocal cord, which is thus left to the action, more and more feeble, of the adductors, to which is added that of the ary-arytenoid and cricothyroid; account must also be taken of the reflex action which the centripetal fibers contained in the trunk of the recurrent may exercise on the vocal cord."

"Finally, when the paralysis is complete, that is to say, when the conductivity of the nerve is completely abolished, all reflex

action ceases as a direct consequence, and the ary-arytenoid and cricothyroid muscles can no longer, of themselves, maintain the cord in its relaxed position, and thus is produced the laryngoscopic image of total annihilation of the nerve."

Harris.

V.—MISCELLANEOUS.

The Treatment of Hysterical Aphonia.

SENATOR (*Berlin. klin. Wochenschr.*, No. 29, 1910, p. 1369). Seifert made the claim that by his method of treating hysterical aphonia, all cases, without exception, could be directly cured. Senator, although finding it of great value, was unable to cure two patients by Seifert's method, which readily responded to other forms of treatment. Seifert's method consists in bending the patient's head as far back as possible. The back may also be bent over the knee of the physician. In this position the patients can always intonate freely. *Horn.*

Epidemic Poliomyelitis.

W. SOHIER BRYANT (*New York Medical Journal*, December 17, 1910) believes that epidemic poliomyelitis is infectious and contagious. It enters the system by means of the nasopharynx. The disease proper, in contradistinction to the sequelæ, is amenable to local pharyngeal treatment. Prophylaxis is attained by nasopharyngeal hygiene. In times of epidemic poliomyelitis all cases of nasopharyngitis should be regarded with suspicion; they should be treated promptly.

Harris.

Latent Infections of the Diphtheria Bacillus.

PATRICK WATSON WILLIAMS (*British Journal of Laryngology*, January, 1910). Cases of latent diphtheria may be grouped under three heads:

A. Patients who offer none of the usual clinical indications of diphtheria, are not definitely ill and yet are found to be anemic or have increased pulse rate, are simply poorly in association with nasal catarrh, membranous rhinitis, faucial redness or slight subacute tonsillitis, otorrhea, sores, etc., which on bacteriologic examination prove to be diphtheritic.

B. Cases with local diphtheric lesion but presenting no general symptoms of ill health—cases which are indisputably latent.

C. Persons who present no local lesions and no departure from normal health, but in whom diphtheria organisms have been discovered by culture tests, e. g., healthy infected contacts.

For the diagnosis of latent diphtheria we have to depend on bacteriology, and the most practical test is a virulence test, morphologic tests being unreliable.

Williams states in regard to treatment that the application of antiseptics gives unsatisfactory results, antitoxin serum has some effect, vaccine may be employed and cataphoresis has, at least in one case, proved beneficial. *Harris.*

Administrative Measures Required for Dealing With Diphtheria Contacts.

DUNCAN FORBES (*British Journal of Laryngology,* February, 1910). Swabs should be taken in suspects, not merely from the throat, but from the nose as well. It has been shown that 1.9% of contacts in schools had the nose infected while the throat was free. Nasal diphtheria is probably much more infectious than throat diphtheria. In schools in which diphtheria has occurred over 8% are diphtheria carriers. Swabs should be made from the throat of all absentees from the class who return shortly before the onset in the patient, provided there is a history of sore throat or cold. Swabs should also be taken from all scholars present or absent who present histories of sore throat or colds. Even if the swabs are returned negative, all persons with sore throats or colds should be excluded from school for a clear fortnight. The Hofmann or pseudodiphtheria bacillus, in view of the careful investigation in Edinburgh and Manchester, can be disregarded.

It has been proved that antitoxin has no effect on the length of infectivity. It is, however, probable that attacks of diphtheria in contacts are rendered milder by injections and are therefore more readily overlooked. It follows that extensive injections of antitoxin would lead to the nonisolation of certain highly infective individuals. *Harris.*

Lactic Acid Ferment in the Treatment of Ozena and Otorrhea.

STEPHENSKI (*Archives Internationales de Laryngologie,* July-August, 1910) has used the lactic acid ferment in twenty-seven cases of atrophic rhinitis. In every case he has been

able to secure the disappearance of the odor in from five to six days and of the discharge in from seventeen to sixty-eight days. In twenty-two of the twenty-seven cases the cure was permanent at the end of one year. His method of employing consists in a preliminary cleansing of the nose, gentle cauterization of the turbinate bodies and a pulverization of the entire mucous membrane with dry lactic ferment. In the interval of the bi- or tri-weekly treatments the patient was given lactic acid ferment in powder form, to be taken twice a day.

He also made use of the ferment in fourteen cases of chronic otorrhea, nontubercular in nature, and in eleven of these cases, without surgical intervention, he succeeded in securing as good results as from the radical operation. In nine of these eleven cases the cure has been permanent.

At each sitting the ear was carefully cleaned, then the galvanic cautery was applied to the granulations or polyps, and finally the cavity filled with the dry lactic acid ferment and sterile gauze, slightly dampened in the ferment, introduced. The cleansing and pulverization was done every day, the cauterization and other treatment only once or twice, very rarely three times, a week.

In spite of his successes the author does not believe that the lactic acid ferment is capable of curing these conditions by itself, but should be employed in connection with certain surgical procedures, such as curettage, galvanic cautery, etc. In this way, as shown in the forty-four cases where it has been employed, it is a decided adjuvant in the treatment.

Harris.

Certain Aspects of Rhinolaryngology and Their Relation to General Medicine.

H. ARROWSMITH (*New York Medical Journal,* December 17, 1910). A desultory consideration of certain conditions of the upper respiratory tract, important alike to specialist and general practitioner. Of these the most interesting are the author's conclusions on operation upon the faucial tonsils.

"1. That pure hypertrophy of the faucial tonsil is essentially a phenomenon of early life; that, except in rare instances, it is rather protective than pathologic, and that even a moderate number of attacks of acute amygdalitis rather substantiates than vitiates the presumption of this protective function.

"2. That the cause of this hypertrophy is very often disease of the pharyngeal tonsil, ablation of which will frequently lead to retrogression of its faucial neighbor.

"3. That up to the age of puberty, at least, a moderate pure hypertrophy should be respected as an evidence of some important functional activity, probably protective in its nature.

"4. That in case this hypertrophy, by reason of its excess and consequent mechanical interference with respiration or audition, demands action, the only justifiable operation is that of amygdalotomy, with preservation of the functionating tissue not in excess, and not of enucleation.

"5. That if the disturbances in the tonsillar structure have been, beyond reasonable doubt, the source of neighboring glandular involvements, which in time may menace the general health, the only justifiable operation is not amygdalotomy, but complete enucleation.

"6. That, after the age of puberty, when the tonsil, like the thymus, perhaps loses its physiologic importance and should normally retrogress, pathologic conditions in the way of cryptic, parenchymatous, or adjacent inflammations and infections, with their possible remote evil results, should be dealt with as thoroughly and as radically as our surgical resources enable us, the same, however, to be employed with a discrimination which sees beyond the obvious local phenomena and comprehends their general importance."

Harris.

BOOK REVIEWS.

"Verhandlung des Vereins Deutscher Laryngologen." Meeting at Dresden, May 1910.

Published by Curt Kabitzsch (A. Stuber's Verlag). Unbound, $1.25.

It is unfortunate that not more of our American rhinolaryngologists are acquainted with the yearly proceedings of the German Laryngological Society. The papers are all limited to ten minutes, and the very cream of the past year's experiences and new ideas are served up for the sharp criticism of the fellow-members. It is very seldom that anything gets past the censorship of the committee that is not worth listening to.

This year's meeting was especially interesting. Some of the topics are of such importance that full abstracts will be found in another part of the ANNALS.

Prof. Denken, of Erlangen, to whom we owe probably the best radical operation on the antrum of Highmore, has at last become an enthusiastic advocate of doing this operation under local anesthesia. He describes his technic in full detail and incidentally sharply criticises the advantages claimed by the followers of the Sturmann operation (known in this country as the Canfield operation). On this point he was sustained in the discussion.

Prof. von Eicken, Basel, recommends a preliminary submucuous resection in operating synechiæ of the nose and then tamponing for a few days. This is a procedure which has already been used in America. When the synechia is located in the anterior part of the nose it is covered with Thiersch grafts.

Qarniko, Hamburg, reports 30 cases in which he has done a submucous resection of the inferior turbinate, where the bony part was enlarged, but the mucous membrane not especially hypertrophied. The report was very favorably received, and in the discussion many similar procedures were spoken of.

Gyergyai, Kolozvar, introduced a novel procedure for inspecting and operating on the nasopharynx without the use of

mirrors. He places the patient with the head hanging down over the end of the table in the Rose position. Then by looking up the soft palate with his finger and using one of the straight 4-20 mm. tubes of Brunning's he is able to inspect all parts of the nasopharynx with great ease. He was able to a pass a tube a few mm. into the opening of the Eustachian tube and so direct the light that it could be seen on the drum. There was no discussion of the paper. The author, to demonstrate the practicability of his method, has already operated through the straight tube, adenoids, hypertrophic posterior ends of inferior turbinates, choanal polyps. By boring through the body of the sphenoid he has easily reached the region of the hypophysis and the cavernous sinus, and considers it a feasible route in approaching these regions.

Möller, Hamburg, relates some brilliant results from the use of atmokausis in ozena. The procedure consists in allowing live steam at a temperature of 116°—118° C. to come in contact with the mucous membrane of the nose for a period of one second in children and two to three seconds in adults. The nose is first thoroughly cocainized. Following the application of the steam there is a profuse watery discharge, which may last for a few hours or may continue for as many days. The procedure should not be repeated until all reaction has disappeared and never oftener than once in from eight to fourteen days. The results are always favorable. The odor disappears at once, and the crusts are more easily blown from the nose. There was no discussion of the paper.

It is hardly fair to the rest of the participants to pick these few examples from the thirty-odd papers, but they give a striking example of the originality of the work. Out of a total of 395 members, 144 were present. The next meeting place will be Frankfort. *Horn.*